CHARACTERISTIC DIFFERENCES
IN
BRIGHT AND DULL PUPILS

HARRY J. BAKER

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CHARACTERISTIC DIFFERENCES IN BRIGHT AND DULL PUPILS

AN INTERPRETATION OF MENTAL DIFFERENCES, WITH SPECIAL REFERENCE TO TEACHING PROCEDURES

BY

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*This report is dedicated to the five hundred
Detroit teachers who contributed liberally
from their teaching experiences*

PREFACE

The purpose of this study is to express in concrete form, characteristic differences between bright pupils and dull pupils. In the past few years a mental testing program of vast dimensions has been inaugurated in many school systems. The program has often gone no further than the testing itself, but it has persisted and continued to develop.

The reasons for this persistence of mental testing are not difficult to find. The test results have a significance in the educational program of all pupils. Superior intelligence and inferior intelligence are obviously different from average intelligence. These differences are usually expressed in the vocabulary of intelligence tests, such as mental age, I.Q., percentile score, or letter rating.

Although teachers have accepted these terminologies, that acceptance has of itself not solved their educational problems with bright pupils or dull pupils. In a general way, teachers have known that dull pupils do not respond to the usual teaching procedures. They have also felt a pride in seeing the results of their efforts richly rewarded in bright pupils. How these results were actually brought about was not explained by the results of intelligence tests, but the teachers were usually convinced that their impressions were confirmed by the test results. Teachers' attitudes toward the testing program have been generally favorable, although their belief in it was based upon meager knowledge as to the fundamental significance of differences in intelligence.

This study has attempted to go behind the scenes of testing and to interpret differences in general intelligence in terms of the psychology of learning. The general differences in mental response have been discussed, the modifications of procedures in the field of elementary education have been treated, and brief consideration has been given to other effects upon school procedures. I believe, that the presentation of mental differences from this point of view is a much more effective approach to the educational significance of mental measurement than test scores. Tests will have a much greater significance in the minds of teachers when the results are translated into units with which they are most familiar.

The principal contributions of this study have been made by five hundred teachers in the Detroit Public Schools. In March, 1926, the district principals of Detroit were asked to select teachers who were successful in dealing with bright pupils or with dull pupils. The elementary principals coöperated with them in making the selections. Teachers were chosen of the traditional subjects and also of the special subjects such as music, domestic science, and auditorium. They were asked to report upon differences as they expressed them in psychological terminology, upon differences as expressed in their methods of teaching procedures and in any other way they wished. This material, I have reviewed and consolidated into the form shown in this treatise. I wish to acknowledge my great obligation to these teachers for their contributions, and to the principals and district principals for their coöperation in selecting the teachers who made their reports.

The mental examiners and field workers of the Detroit Psychological Clinic were asked to present suggestions which were expressed in terms of the typical reactions of bright pupils and dull pupils. Their contributions formed a very significant check upon the reports from teachers, and their suggestions were invaluable. I also acknowledge my obligation to Dr. Charles S. Berry, Director of Special Education, who initiated the X, Y, and Z grouping in the Detroit Public Schools in the spring of 1920. Dr. Berry proposed the plan of organization which was unanimously adopted by Superintendent Cody's administrative staff. Grateful acknowledgment is also due to Dr. Guy M. Whipple for helpful criticisms and suggestions. The constant aid and suggestions of the writer's wife, Elizabeth Baker, have been invaluable and have made possible the preparation of this manuscript.

HARRY J. BAKER

Detroit, Michigan
June, 1926

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PART I

DIFFERENCES IN MENTAL CHARACTERISTICS

CHAPTER I

INTRODUCTION

Mental measurement is a familiar topic to all teachers and to school administrators. This treatise on intelligence is not designed for the purpose of introducing or of 'selling' the idea of psychological examining to schools. That work has already been done. The individual Stanford-Binet Test, the Army Alpha Test, and various group intelligence tests are matters of common knowledge in schools. Of course, a few teachers have given mental measurement the same scanty notice which they have shown to other new procedures and honestly believe that they can learn nothing of value from it—which is probably true. But the rank and file of educators have not dismissed the topic so easily.

Intelligence tests have an appeal because they are definite and objective. They usually confirm the opinions which have been formed of pupils, or if not, they give rise to speculations about the reasons for discrepancies. Yet these reasons alone are not sufficient to prolong the general interest in mental measurement. Specialists in research, mental examiners, and careful students of child psychology would continue to find results of mental examinations of some value in themselves, but classroom teachers would be too busy to follow a system of descriptive terms, or to spend their valuable time in giving and scoring tests, and recording the results. There must be something more fundamental behind the movement than these external symptoms to warrant the continued interest that is shown. The reasons for the popular interest of teachers in mental measurement are the object of this treatise.

The fundamental issue in mental measurement is not that a child with an I.Q. of 80 is dull and backward, or that a letter rating of "A" indicates superior ability. The problem really lies in the kind of education which the dull pupil or the bright pupil is able to assimilate. The methods of learning which are characteristic of the dull child, are what the teacher is really seeking. She has probably expected somehow to find those methods in the I.Q. itself, and so her faith in the function of measurement has been of long duration. In like manner, the high test scores of gifted pupils have been looked upon with great satisfaction as aids in the education of superior minds. But, of course, these symbols of intelligence mean relatively little in themselves; the characteristic learning processes which they symbolize constitute the important problem.

Interpret Intelligence in Terms of Teaching Procedures

This study attempts to look behind the scores of intelligence measurement and to interpret mental differences in terms of classroom procedures—to seek out the real differences as the teacher finds them. Testing serves no very useful end if it merely enables a school administrator to select a group of backward pupils and to assign them to a teacher who is unwilling to find out how those children learn or at what level instruction must be carried on to be efficient. The suggestions that are listed in this study are designed to aid in the instruction of dull pupils and of bright pupils. Instead of interpreting intelligence in terms of I.Q., the aim is to interpret intelligence in terms of teaching procedures.

In dealing with mental differences from this point of view, we find that a low I.Q signifies a pupil who must have material presented in short and simple units, with immediate ends, whereas a high I.Q. signifies the need of large units of a comprehensive nature, which have very ulterior ends. The low I.Q. denotes work of a concrete nature, whereas the high I.Q. denotes work of an abstract, generalized, and complicated nature. Dull intelligence meets mental demands in the very symbols of learning, whereas bright intelligence meets no such demand, but uses these symbols as tools for a larger meaning. The low I.Q. often signifies a narrow, and individualistic point of view, whereas the high I.Q. usually symbolizes a thoroughly social point of view and a power for coöperation in civic enterprises. These statements are not the final function of mental measurement, but they must be interpreted into the minute details of instruction in a constructive way if they are to be effective.

Mental measurement, itself, will have more meaning and will be in greater demand for the proper classification of all pupils, if efficient instruction is thereby rendered more effective. The mental status of each pupil will take on more than a passing interest to the teacher when it is realized that variations of procedure are of fundamental importance to the pupil's success in school.

In this study, pupils have been divided with respect to intelligence, into three general groups: the dull, the average, and the bright. The dull comprise the lower fifth or fourth of all pupils in intelligence, exclusive of the truly backward or subnormal, who are educated in special classes for defective children. The dull group may be defined psychologically as ranging from 70 to 90 in I.Q. or from three years to one year mentally retarded at the age of ten years. On group mental tests they include the lower twenty or twenty-five percent in score at each age. Under the Detroit plan of testing, these pupils are rated D or E. The bright comprise the upper fifth or fourth in general intelligence, exclusive of one or two percent who should be rated and taught as geniuses. In I.Q. these pupils range from 110 to 130, and in mental age they are from one year to three years accelerated at the age of ten years. On group tests they are rated A or B. The average group ranges in I.Q. from 90 to 110, in group ratings from C– to C and C+. They comprise from fifty to sixty percent of the school population.

Only the bright and the dull groups are considered in this study. Teaching procedures for the subnormal and for the especially gifted concern such a small group of pupils that they have not been of general interest to the rank and file of teachers. The treatment of the average child has also been neglected in this study on account of the limitations of time and of need; the general procedures of education have been comparatively well adjusted to the needs of the average group, and a better knowledge of the extreme groups will also throw some additional light upon the problems of the average child. The average child probably strikes a medium between the marked differences that have been noted in bright pupils and in dull pupils. The manner in which these differences must be compromised in teaching average pupils may prove that the psychology of average learning is not as easy as it has been commonly supposed to be. The best suggestion that this study has to offer for teaching the average child, is to point out the danger of making extreme departures in either direction or to use methods specially suited for the other groups.

In making the educational applications to bright pupils or to dull pupils, teachers should not be disconcerted in finding exceptional cases whose traits of learning do not follow these general qualifications. The writer is firmly convinced that the qualifications and descriptions apply to practically all dull pupils as a class, or to all bright pupils as a class, as the case may be. These opinions are the summaries of observations by about five hundred Detroit teachers in elementary grades whose descriptions have made this treatise possible. The agreement among their conclusions is very striking and remarkable. The statements which are characteristic of the learning of dull pupils in one subject correspond very closely to the characterizations in other subjects. They differ only in details and do not differ in principles. Furthermore, they verify the general observations that have been made upon dull pupils in the processes of psychological examinations. My own experience, as well as that of other members of the clinic staff, has been drawn upon in making the observations about general psychological differences. The unanimity of opinions from so many sources makes the evidence worth careful consideration.

This study is presented in three main divisions: (1) the general differences in intelligence between bright pupils and dull pupils; (2) differences between bright and dull pupils as expressed in terms of subject matter and the psychology of classroom instruction; (3) adjustments of the school organization which will enable teachers more efficiently to carry out the type of instructional program which is needed. This third part is of concern chiefly to school administrators who hope to improve the efficiency of their school system.

Although this study has emphasized the importance of general intelligence as a factor in school success, it should not be assumed that intelligence is considered to be the only factor which operates in the psychology of learning. Good teaching, regular attendance, effort, and personality, will continue to exercise their influence upon scholarship. The effect of these factors may be studied much more scientifically if more complete control and knowledge of the intellectual factors have been secured. While these factors are important, I believe that general intelligence is the most important *single* factor in learning. The evidence from teachers makes this belief more and more convincing.

Teachers should not be discouraged because this treatise does not present a complete outline of procedure in their special subjects. That type of development must await the work of specialists in the various instructional fields. This study is a foreword for the work which must necessarily follow in the improvement of instruction.

CHAPTER II

FALLACIES ABOUT GENERAL INTELLIGENCE

Many fallacies and misconceptions are popularly current with regard to general intelligence. These erroneous ideas pertain chiefly to the judgment of intelligence from physical characteristics or from special types of behavior. While most of these symptoms have little or no diagnostic value, their influences are quite important upon the opinions of persons untrained in mental measurements. They tend to confuse the real issue in dealing with intelligence, and therefore a few of them are worthy of mention.

Physical Activity

While there is a fair positive correlation between degrees of intelligence and physical activity, a few marked discrepancies do occur. The hyper-active dull child is frequently regarded as bright, and the quiet, bright child is often considered as dull. Physical activity is believed to indicate the same kind of mental activity. Such children may capitalize their physical traits to their advantage or be penalized by them as the case may be. The writer has examined feeble-minded children who were so active that they could scarcely be controlled long enough for the administration of the mental tests. Not only in quantity of mental ability, but also in quality, they were very deficient. Such physical activity is not a safe guide to intelligence. Activity must be judged not only in itself, but in respect to the type of mental action it is trying to reflect.

Tendencies to Verbalism

The dull verbalist type is more misleading than the physically active type. Words and ideas are more concrete evidences of intelligence than movements, for they typify mental effort. The only sure way of judging the value of the verbalist's ideas is to analyze them carefully for coherence. His ideas will then prove to be more or less jargon, characterized by a very simple vocabulary, which is his chief stock in trade. Such types of pupils give voluble definitions of words whose meaning is entirely beyond their knowledge or comprehension. High-sounding phrases, repeated after hearing others use them, are favorite tools of expression. The writer recalls one verbalist eleven years of age who tested mentally four years, and was excluded from the schools. This boy's aunt had undertaken his education, and the chief contribution he had received from her was the term "an adverbial phrase." When he first used this expression, it naturally surprised the listener, but after he had introduced it as answer to every question he didn't know, its effectiveness vanished. There are other verbalists, less extreme, whose cases are not so noticeable, but careful analysis from the standpoint of coherence is the safest test of their ability.

Mastery of Special Stunts

Another source of deception in the judgment of intelligence is the possession of one or two special tricks or stunts. This result has usually been accomplished by long training upon that one factor alone. However, the special training has not entailed improvement in the general field of learning. A fond mother declared that the diagnosis of her boy, aged eight years, as feeble-minded was absolutely wrong. Upon being asked to explain what he could do to show his intelligence, she mentioned that he knew enough to turn down the corner of a rug after some one had accidentally turned it up. Such an action, when used with many others of a similar nature, would clearly indicate ability, but one response alone is scarcely more than what can be expected from the techniques of animal training. An isolated fact seems important, but may mean nothing significant.

An Attitude of Sincerity

The backward individual who does things in a very sincere manner is often given much more credit than his actual performance warrants. This practice is especially confusing when it is done with great solemnity and with perfect emotional control. The human weakness of giving credit for effort, rather than for performance, is a very commendable trait in many circumstances, but serves no useful end in cases of gross inefficiency. In fact, to call attention to errors would oftentimes be a real service. However, the very attitude in which these futile efforts of the sincere, but in-capable, are performed, is so convincing that we are inclined to believe that they actually understood, but that they were accidentally wrong. To correct them might shock their sensitive natures and ruin their self-confidence, so they usually go on unmolested with their sober list of errors. One high-school girl of this type, with a mental age of ten years, was brought in for examination. The teachers apologized for questioning her ability at all, and hoped that her good ability would be substantiated. There is a vast difference between performance and effort. Society eventually judges by performance, as a general rule.

Dress and General Neatness

The pupil who is well dressed and neat in his appearance is judged more favorably in intelligence than is one who is poorly dressed. Care of external detail is taken as symptomatic of care in mental detail. Very backward children who come from good homes are usually well cared for, so that in judging their intelligence it is difficult properly to discount these factors which are not controlled by the pupil himself.

Physical Characteristics

The effect of physical characteristics in judging intelligence is one of the most difficult problems for the untrained observer. The sparkle of the eye, the shape of the ears, the height of the forehead, the firmness of the chin, the lines of the face, are popularly supposed to have great significance. As a matter of fact, they really have no important significance as a measure of intelligence. The writer has often been urged merely to look at a certain pupil, and to make his judgments upon those impressions. It is true that a few physical signs are frequently found as characteristic of backward children, but they also may occur in other types of intelligence as well. For example, deformed ears are rather common among the feeble-minded, but they are also found frequently in normal children. Feeble-minded children often walk with a shuffle, but diagnosis upon this factor alone would be most hazardous to the professional reputation of the psychologist.

Popular belief in these external symptoms has opened a great field of charlatans, phrenologists, and character experts who collect from a gullible public fees all out of proportion to the service they actually render. Carefully controlled experiments as to the validity of their judgments show that there is little or no basis for their conclusions. In fact, what facility they have lies in the nature of their descriptions and shrewd guesses, rather than in the use of really important symptoms. They tell the subjects who come for analysis a few pleasing generalities about themselves which are probably true of them and of nearly every one else too. They vary their vocabulary and repertoire of terms sufficiently from person to person to imply careful individual attention. The best refutation of this entire movement would be to apply their criteria first to a group of inmates in an institution for the feeble-minded. In doing so, they would find every kind of physical trait. In like manner, by inspecting a great number of teachers, doctors, or scientists, who represent the opposite extreme in intelligence, the same wide array of physical characteristics would be disclosed. Nothing further need be said. It is what is 'inside' that counts.

The Individual Exception

One more type of case merits consideration. It is the pupil who has seemed to be an exception to all the rules, and who, on account of his unique case, is remembered distinctly, much better than the large group who conform to the usual expectations. This fallacy of over-emphasizing the exceptional case is a characteristic mistake of the untrained mind. The evidence from one thousand typical cases that follow fairly fixed rules unfortunately does not carry as much weight as the occasional exception to those rules.

All of the factors listed above, when functioning individually or in combination, may obscure the real effect of general intelligence. Eventually, these confusions are usually revealed by the continued operation of the defective or of the superior intelligence. The latter must often work against tremendous odds when the physical conditions and personal impressions of its possessor are unfavorable.

In a negative way, this discussion has attempted to show what does *not* constitute general intelligence. The following chapter will deal with constructive issues and with characteristic differences between bright and dull minds.

CHAPTER III

DIFFERENCES IN GENERAL INTELLIGENCE

The discussion in the preceding chapter has described general intelligence from a negative point of view. Verbalism, physical activity, and impressions of sincerity are not evidences of general intelligence and may not even be related to it. General intelligence is not to be determined from external symptoms. It is something which comes from within. A person is not bright or dull because he looks the part, but because of the quality of his thinking. If he is a clear, resourceful thinker, he is said to be bright in intelligence. If he is a vague and inadequate thinker, he is of poor intelligence.

Judgments of intelligence cannot be made from the external appearance. The psychologist takes note of a few very obvious and outstanding physical characteristics, but his real impressions are gained from the answers to his questions. Questions may be about the child's age, his name, his school work, and similar topics. By long and careful research, definite questions have been prepared by the psychologists which are known to have a definite value or expectation of successful response, at certain years in a child's life. These questions are assembled to make a scale of intelligence measurement.

Physiological Basis of Intelligence

General intelligence is in reality an expression of the ability to think or to act in a logical way. It cannot be measured as a direct and concrete entity. It must be measured by the analysis of its outcomes in thought and action. The determination of general intelligence goes back to the readiness of the brain to function in a characteristic manner, such as would yield results varying all the way from idiocy to genius. This readiness of the brain or central nervous system to function, is in turn dependent upon the physiological composition of the brain structure itself. Some brain structures seem to conduct mental impressions easily from one nerve center to another; other brain structures conduct impressions with great difficulty, and the difficulty is characterized by inaccuracy. Intelligence has its 'seat' in the connecting centers of the brain, and the facility or the difficulty of making these connections determines the brightness or dullness of any person. The real mystery of the origin of intelligence lies in the ability of these pathways to make accurate and easy connections.

If we attempt to trace the problem of the origin of intelligence much further, the road is not well-marked. Recently, the writer questioned a reputable neurologist about the physiological composition of the brain and its relation to general intelligence. He was informed that post-mortem examinations of the brain of persons whose degrees of intelligence were well known, disclose no features, either size, shape, or composition, which are generally characteristic of brightness or of dullness. The only exception is reported to be a general deterioration of structure in some cases of extreme feeble-mindedness. There is little need of following this line of approach much further, in view of the present inadequate state of information. And if the facts of intelligence could be learned from this source, the practical limits of physiology are such that these sources are not available within the lifetime of the individual.

The seat of intelligence, therefore, is bound up with the physiological constitution of the brain, and is centered around the ability of the neural associations to make the proper contacts. In theory intelligence might be measured in terms of the ability of the association centers to conduct excitations, but in practice this is exhibited in the thoughts and in the actions of the individual. The cartoon of a newspaper correspondent a few years ago which showed a very learned psychologist puzzling over a test tube whose contents had supposedly been drawn from the brain of his subject, symbolizes many popular misconceptions about the nature of intelligence and of its measurement.

The Inheritance of Intelligence

The tendency toward brightness or dullness is inherited. Goddard[1] discovered that the inheritance of intelligence follows the usual biological laws of inheritance. The Mendelian theory of inheritance applies to intelligence as well as to plant and animal breeding. Brightness is a dominant trait and dullness is recessive, in the same manner that tallness is dominant and dwarfness is recessive in the crossing of tall and of short peas. This dominance of brightness is probably an important factor in the maintenance of the general level of human intelligence. The substance of these theories as applied to the inheritance of general intelligence is shown in Table I.

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[1] Goddard, Henry H. *Feeblemindedness: Its Causes and Consequences.* The Macmillan Company, 1914. 555 pp.

TABLE I.—LAWS OF HEREDITY AND INTELLIGENCE

		Types of Children			
Case	Types of Parents	Bright	Average	Dull	Total
1	Bright and Bright..............	4	0	0	4
2	Bright and Average.............	2	2	0	4
3	Bright and Dull................	0	4	0	4
4	Average and Average............	1	2	1	4
5	Average and Dull...............	0	2	2	4
6	Dull and Dull..................	0	0	4	4

The data of Table I should give warning that conclusions about the intelligence of one child which are drawn from the intelligence of the other members of the family may be very misleading. For example, in Case No. 5 there are two dull children. The conclusion would be erroneous that the other children of that family are also dull. The actual expectation for the others would be average intelligence instead of dull. In Case No. 3 one dull parent mated with a bright parent produces average children, which is definitely above the level of at least one parent. In Case No. 4, the mating of average with average, one child is above both parents, two are the same as the parents and one is below. Superior intelligence is not recruited from superior parents alone, one-fourth of the number of children of parents of average intelligence are superior. While recent hypotheses point toward multiple rather than simple factors in the inheritance of intelligence, the general results of inheritance would be substantially equivalent in both cases.[2] In the light of this evidence, no final estimates of intelligence should be made by merely judging the other members of the family.

DEFINITIONS OF INTELLIGENCE

From the considerations in the opening paragraphs of this chapter, it is evident that intelligence is to be defined in terms of responses which are made possible by the physiological constitution of the brain. That is, in determining intelligence, we must accept the external products as measures of what is hidden from the eye and inaccessible to direct measurement. Indirect methods must be used. How bright a child really is, must be estimated by the cleverness of his responses and by the logic of his actions. The actual definition of general intelligence is a difficult problem. A symposium of the opinions of fourteen psychologists[3] on this problem showed a general agreement on the idea that general intelligence is the result of mental activity. From an educational point of view, Buckingham regards it as "the ability to learn," which is a very concrete definition in terms of school procedure. "Ability to make the adjustments to society" is another definition from a somewhat different point of view. Terman defines intelligence as "the ability to carry on abstract thinking." Definitions may be as numerous as are the activities in which intelligence plays a part. For example, the entire second part of this treatise, which deals with differences in learning in subject matter, is really a detailed and comprehensive definition of intelligence.

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[2] Hunt, Harrison R., "Intelligence as a Mendelian Character." *Journal of Heredity,* vol. 17, No. 2, pp. 53-58.

The Limits of Intelligence

General intelligence may be defined in terms of the ability to respond to situations in a logical manner. By such a definition all shades or degrees of intelligence are to be found in the human race. At one extreme, the lowest type of idiot is so lacking in general intelligence that he responds only to his bodily needs, and these responses are so simple that instinct, rather than reason, is the guiding principle. From these lowest types, there are found all degrees of greater and greater excellence, until at the other extreme is the genius whose actions are governed in a very logical manner. All the other degrees of human intelligence are to be found between these limits. They are well scattered along the way, with a few more imbeciles than idiots, and a few more superior than true geniuses. The rank and file center around the average, but enough individuals vary widely enough from this midpoint to warrant special educational procedures to meet the demands of their intelligence. The material in this study which deals with subject matter is an attempt to state the type of such educational adjustments for bright pupils and for dull pupils.

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[3] *Journal of Educational Psychology,* March, April, and May, 1921.

Fundamental Similarities in General Intelligence

There are certain ways in which the general intelligence of a dull pupil is similar to that of a bright pupil. They are similar to each other in the simpler forms of intelligent response. That is, they are similar in those mental activities which are just above the level of instinct or of reflexes. When a simple mental response is evoked, there is very little difference between the manner in which bright minds and dull minds respond. For example, the flash of a gun stimulates the eye, the sound of the report stimulates the ear. A simple bond is formed between the optic regions and the auditory regions of the brain. In this very elementary form, there is little difference between the responses of the bright and of the dull mind. In fact, the entire action is hardly more than a reflex action. There are probably some actual differences between the character of responses at this basic level of mental activity, but fundamentally they are very much alike. Other illustrations of comparatively simple mental response are: the ability to copy or say the same letter of the alphabet many times, the ability to repeat two numbers, such as three and eight, after the examiner pronounces them. These basic responses are so similar in all types of intellect that they are quite confusing to those who do not understand the fundamental nature of intelligence. In the field of mental responses of a slightly higher order the same confusion may result, but to a lesser degree. If a bright pupil and a dull pupil are both asked to cancel out every letter 'a' which they find in a page of letters arranged at random, the dull pupil is apt to equal or excel the bright pupil. To the dull pupil the task is so simple that he finds it a 'natural' mental activity. For the bright pupil it is so easy an activity that he may scarcely bother to keep it in the level of consciousness; he transfers his attention to chance combinations of letters which spell words, or he becomes interested in how frequently the letter 'a' occurs, and on account of these disturbing factors he may not make a very high score. Dull pupils usually think of nothing but the letter 'a' and make good progress. Many things of this sort could be combined into a series of tests which would not show real differences in intelligence, although they might have all the appearances of being valid measures of mental activity. There are certain mental tasks of a very simple routine that really do not make any great demand upon intelligence, but which might erroneously be deemed valid evidences of ability. These tendencies are frequently mistaken for high ability. For example, a dull pupil is sometimes able to read difficult words orally in a fluent way, but a careful analysis may show that his reading was merely 'word calling' with little or no comprehension of the meaning. Intelligence may be of a very elementary nature and involve the exercise of one simple bond, or mental connection. At this stage, bright pupils and dull pupils may appear to be equal in intelligence, or, indeed, the dull pupils may sometimes excel.

Fundamental Differences in General Intelligence

A few ways have been pointed out in which the intelligence of bright pupils and of dull pupils seems to be quite similar. There are many ways in which they are entirely different. The essential factor which discloses those differences is the multiplicity of associations or of learning bonds that are called into action. In a simple association the blast of the gun provokes a visual impression which becomes associated with the expected auditory impression. A more complex association of the same kind would be illustrated in the case of being able to open any door after having learned to open one particular door. In very simple learning the successful solution may be confined to one special door, whereas average or bright intelligence can bring enough associative bonds to apply to all doors. Superior intelligence is characterized by the ability to create and to successfully manipulate many associations in order to solve its problems. Inferior intelligence lacks these abilities in a very striking way. A dull individual probably attempts to recall the name of a new acquaintance by the simple act of recall. If this direct bond of learning does not function, he is quite at a loss. But superior intelligence is not rebuffed if the direct bond does not work. The superior mind immediately begins to search for other bonds to make the recall. The new acquaintance is remembered as resembling some other person with a similar name or he is associated with the street or building in which the meeting first occurred. If these ideas fail, recall is attempted by reviewing certain letters of the alphabet which are likely to be the initial letter of the name. First one association and then another is tried until one of them produces the desired result. There is a great resourcefulness of the superior mind in seeking the solution of its problems.

Dull pupils are deficient in many abilities which require the proper coördination of two or more mental functions. They are doubly weak when these functions must work in combination. The more complex the mental faculties involved are in a mental activity, the greater is the excellence of the bright pupil and the more restricted are the abilities of dull pupils. Complex mental activities disclose greater contrasts between bright and dull pupils than do simple mental activities. Therefore, complex mental problems and activities are the favorite types of material for general intelligence tests. Successful psychological examinations date from a comparatively recent time when this principle was first conceived by Alfred Binet. Before his time, the measure of intelligence was confined chiefly to simple mental tasks, such as rote memory for a span of unrelated numbers. This is an aspect of the psychology of special faculties which will be discussed in the next chapter.

Differences in General Mental Activity

Bright minds are fundamentally different from dull minds in many respects. In judging general intelligence the manner in which a pupil responds is almost as important as the score he makes on mental tests. Some of these qualitative differences will now be discussed.

A dull child is quite liable to give the same answer to several different problems or situations. If he is asked to choose the prettier of two pictures or the heavier of two weights, he may do so correctly on the first trial. But if the second trial is given with the position of the two objects reversed, the dull child is very liable to choose the one in the same position as before, and continue to select the one in this position throughout several sets of choices. At least half of these results would be wrong through chance selection, but fifty percent in accuracy is not as significant as the fact that the same choice was made each time by position only. This type of response is known as ''stereotyped reaction.'' It is common with dull pupils and explains many of their errors. It is evinced in the classroom by giving the same answer to two different problems in arithmetic, by adding in all problems when addition is actually required in the first problem only. Mental inertia is one cause of this tendency; another cause may be that the first response was correct and pleased the teacher or examiner, so the child thinks that the most certain way to please a second time is to repeat the first response in identical form. In the education of dull pupils, they should often be corrected or the problems should be so devised that errors of this kind would be very obvious to the pupils themselves.

Another characteristic trait of dull pupils is their inability to detect their own errors. They make such absurd mistakes that their lack of ability in self-correction is sometimes mistaken for deliberate disobedience. The dull pupil does not know that he is wrong and is quite confident that he is right. He is very lacking in the power of self-analysis. In trying to check his work he merely repeats the same processes in the same way. He gives high-sounding definitions of words which he does not actually know, nevertheless he is well pleased with his efforts although they are obviously inaccurate. It is probably this lack of realization which prevents him from being overcome by the power of his inadequacies. A reasonable amount of correction and warning by the teacher is desirable, but it should not be so marked as to discourage the dull pupil completely. A better means of improvement would be to adjust the level of difficulty and the methods of work so that dull pupils would not be victimized in these ways and would be able to check their own errors. It is doubtful, however, whether this tendency could be entirely overcome, for it seems to be a fundamental characteristic of dull minds.

Inadequate powers of analysis and of general reasoning ability are also marked in the case of dull pupils. They find it difficult to detect the absurdity in an illogical statement. The meaning or content of an absurd statement is not comprehended. The words of the statement may all be familiar to the dull pupil and he allows his mental curiosity to stop at that point, rather than to go into the meaning itself. The recognition of the meaning of single words is a comparatively simple mental activity and, therefore, is easily grasped. The combination of words to form thought-units is a complex process and calls upon high levels of mental ability.

In forming associations between words or ideas, the dull pupil is characteristically weak. If the dull pupil is asked to name off a series of words at random, he usually mentions one word of a kind only, whereas the bright pupil immediately exhausts the entire list of that particular group. For example, the word "chair" may suggest many other pieces of furniture to the bright pupil, but the dull pupil seems to form no connection between this article of furniture and the others of its class. He passes on to another isolated word of a different class and as a result his general product is unsatisfactory in quantity, and also in quality. Not only the number of words is inadequate, but the relationship between words is very meager.

The very nature of the intelligence of dull pupils is such that they find it necessary to have their work broken up into short, simple units. They do not grasp or retain the long and complicated problems which are required in many kinds of school activities. The reason they fall short in this respect is due to the fact that their associative powers are weak and all of the factors are not understood in relation to the entire problem or situation. On the other hand, bright pupils do not find as much mental appeal in simple situations. They crave opportunities to give free and full play to their mental powers. If such values are not realized, the task is liable to become uninteresting on account of its very simplicity. Bright pupils probably appreciate having their work in short, easy units for execution, but they look for a larger meaning behind these units.

Another important difference between bright and dull pupils lies in the way in which they respond to all situations. Dull pupils are inclined to be impressed with the physical or mechanical aspects of a situation, whereas bright pupils are more impressed with the mental significance of it. For example, in handwriting dull pupils give undivided attention to the mere act of writing, while the bright pupil pays little attention to that but emphasizes the message or content of handwriting. In domestic science the theory of cooking, the interpretation of the recipe, furnishes a problem for bright pupils, but dull pupils pay little attention to these things and are more concerned with the actual execution of the process. On account of paying too little attention to the mental content, inadequate knowledge leads to faulty performance, whereas bright intelligence understands the theory and does the practical applied work much more carefully on the mechanical side than the dull pupil does.

Finally, dull pupils usually have poor social intelligence, and bright pupils excel in this respect. Bright pupils are able to reason or to rationalize their personal feelings out of many situations and hence are able to take a greater interest in other people. Dull pupils are inclined to have an individualistic point of view, though in trying to satisfy their own needs, they naturally encounter many situations where there is a definite need of considering the welfare of someone else. The psychological basis of such action is readily understood, but the actual operation of these principles in society does not produce satisfactory results. Society tends to judge by one standard alone and not all individuals are suited to make normal judgments.

We have described several important traits of a general psychological nature with regard to bright and to dull pupils. Much more remains to be done by the psychologist and educator in this direction. This type of information should be incorporated in the teacher-training courses, as well as be the topic of research for many who are working upon the improvement of teaching.

CHAPTER IV

DIFFERENCES IN SPECIAL ABILITIES

In addition to the field of general intelligence, special psychological abilities and disabilities form an important field for the better understanding of bright pupils and of dull pupils. Special abilities or special mental traits are given a very important place in popular opinion. There is a general belief that every individual has some special trait or talent and that, even in the case of general deficiency, it compensates to a very great extent for mental backwardness.

These beliefs are not substantiated by the facts. There is a fairly high positive correlation between degree of general intelligence and the degree to which special ability or special mental faculty is possessed. That is, high general intelligence usually carries high special abilities and low general intelligence low ability in special mental faculties. A few cases exhibit exceptions to these general rules, but their number is much less than is commonly supposed. Contrary to opinion, the power of such special defect or special talent as may exist to offset the effect of general intelligence is comparatively insignificant. There are, in this connection, four types of special talents or defects that should be considered.

The first type is the bright pupil who has a special mental disability—that is, some line of activity which is definitely below the level of his general intelligence. In such a case the pupil usually seems to suffer very little from this special deficiency. In fact, instead of being handicapped, he often uses his other mental faculties to circumvent the weak spot in his mental armor. For example, if a defect occurs in visual rote memory, the pupil translates the visual units into auditory units by repeating aloud what has been presented to him visually, and thus gets an impression upon his mental 'field' where it is more easily and more clearly received. Adults of average or of superior intelligence use this device constantly. They learn by experience in what ways their special defect may be overcome. The bright mind is able to find means of circumvention, by the very fact of its great resourcefulness and versatility. Here, the chain is really not as weak as its weakest link.

The second type is the dull pupil with special defect—the special disability is much below the general low level of the dull pupil's mind. In this case, the disability is a serious handicap, for the dull mind lacks the resourcefulness to circumvent the weakness. If the weak trait in question is called upon, the dull pupil is at a complete loss; he does not know how to substitute some other faculty and thus to proceed successfully. One of the most important requirements for the successful teacher of dull pupils is the ability to discover these particular weaknesses and patiently to show the pupil how to proceed along other avenues.

The dull pupil with a special talent above his general level is a third type which merits consideration. This talent is both an asset and a liability to the dull child. It is an asset in that it gives him confidence to an unusual degree. Dull pupils who are especially good in rote memory make very good progress with the fundamentals of learning that are not much above the rote level. The special talent is often a liability to the dull pupil because he uses it indiscriminately to the detriment of his general mental and educational progress. It is a frequent observation of teachers that dull pupils seem to excel other pupils in the early elementary grades, but come to a sudden standstill when the school work requires general powers of reasoning and association. On account of lack of judgment, the special talent is exploited in ways which build up the present at the expense of the future. Teachers will often do well to discourage, rather than to encourage, the exploitation of special ability in dull pupils.

The fourth type is the bright pupil with a special talent. This combination furnishes very excellent results. Superior minds do not tend to branch out in any direction to excess, and therefore, seldom abuse the advantages which they have. The special talent is used by the bright pupil to explore and to scout far into new fields, but the building up of workable lines of communication to the settled and the familiar fields is not neglected. Under such circumstances the special talent is a general tonic for the bright mind and gives it a desirable emotional tone. The real advance of civilization is probably bound up with the proper use of the special talent of superior minds.

These four major categories of the relationship of special talents and defects to general intelligence should receive careful study in any program of education.

RELATIONSHIP OF SPECIAL ABILITIES TO GENERAL INTELLIGENCE

In the preceding paragraphs special abilities have been discussed with respect to their relationship to inferior intelligence, and to superior general intelligence. There is another problem of relationship between special abilities and general intelligence which merits further consideration. The average man, without training in psychology, believes that general intelligence is composed of a series of special mental faculties which function either in combination or by themselves. These special faculties are believed to be of great importance and so powerful that they are able to operate by themselves without much reference to the other faculties of intelligence. As a matter of fact, this belief is quite at variance with the real nature of intelligence. Intelligent responses are derived from the general coördination of all the special faculties, and these special faculties, in the opinion of Thorndike, have many points in common. Another view, held by Spearman and Burt, is that general intelligence is composed of a central factor which operates in all mental activities, and in special abilities. It would be beside the point of this discussion to make elaborate explanations of these two theories. The writer believes that there are many elements common to both of these points of view. The fact that a close relationship exists between special faculties and general intelligence is the matter of greatest importance for this discussion.

Those who have had little or no training in psychology try to explain success or failure in terms of special mental faculties. For example; a pupil who is backward may be described as being "backward on account of poor memory." But if we examine "memory" very closely, it may have in it certain elements of association and of reasoning. So, it is difficult to state just what are the limits of pure memory, or where it merges into some other faculty. If memory is closely allied to reasoning, to association, or to other mental faculties, the improvement of memory would necessitate the improvement of the other faculties. This improvement would probably mean that general intelligence had also been improved. But the assumption that general intelligence is capable of improvement is contrary to any findings to date. To insist that a dull pupil would improve mentally if his memory would improve is a truism, for in order for memory to improve, the related faculties would also need to improve, which would also improve general intelligence. If these related traits did actually become more efficient, memory would probably share the general improvement. But the idea that improvement in memory alone would be sufficient to raise the level of ability is quite erroneous. Still others ascribe poor school work to ''defective judgment,'' but judgment is closely linked to memory, to reasoning, to imagination, etc., and therefore the question of improvement is doubtful in this case. In an inverse manner, superior general intelligence is often claimed to be entirely due to one factor, such as ''concentration.'' Although concentration is a condition of mental activity, rather than a function, an excellent memory, good reasoning, and other superior factors must all be present and each make its contribution if there is to be successful concentration. Otherwise, concentration could not be excellent. It would probably be nearer to the truth to describe brightness or dullness in terms of general intelligence than in terms of the operation of special faculties. Sometimes special faculties may operate in powerful ways, but they cannot permanently offset the effect of general intelligence, except usually to hinder, rarely to assist, its operation.

THE FUNCTION OF SPECIAL ABILITIES

Special mental faculties are quite subservient to the effects of general intelligence. They are in reality secondary factors in successful learning. In the writer's opinion they are sub-factors in general intelligence, and general intelligence may be better understood by a consideration of them. Accordingly, a few of these terms that connote special faculties will be discussed as a means of throwing more light upon the nature of general ability.

The term ''judgment'' has been mentioned earlier as a special mental faculty. It may be defined as a faculty that is concerned with making decisions about two or more possible courses of action. It is related to brightness and to dullness in a very significant manner. Dull pupils are required to pass judgments, and in doing so may leave out some very important items which should enter into the decision. For example, in a typical instance, a dull child may have been told to take the right fork of the road, instead of the left one, at a certain corner. The directions included a description of a tree near the proper turn, and of the kind of road he will be traveling. But when he arrives at the parting of the ways, he has possibly forgotten to look for the tree, and he chooses the wide road, or the paved road because it looks easier to travel. His 'judgment' may be described as 'poor,' but it is poor because memory and other faculties failed him at an important time. The bright child tends to remember all of the directions; he chooses the right road, and his 'judgment' may be considered 'good.' This simple illustration of judgment has an important application to the methods of learning. Our methods of teaching must be adapted definitely to the dull pupils in one case and in the other case as definitely to bright pupils; for each class learns in a different way.

Another term in common use is "association." Association is closely related to memory and to reasoning. Bright pupils are very adept at associating ideas because they are able to bring all their other faculties to bear upon it. They form associations out of a vast reservoir of experiences, which has been the result of close observation and of accurate memory. They are able to generalize upon new topics or upon strange and unfamiliar experiences and understand them, so they are said to be good in association. The dull pupil is apt to be as poor in association as he is in general intelligence. His poor memory is a hindrance rather than a help in making correct associations. He does not recognize and attach meaning to strange and unfamiliar situations, because he cannot associate them with other familiar objects. Thus, he has many associative limitations.

"Memory" is a third mental faculty which may be considered briefly. Memory is not a simple mental faculty. Memory may be classified according to the sense organs by which the impressions are received, e.g., auditory memory, visual memory, motor memory, and several others. It may also be classified according to the nature of the material which is being remembered. "Rote memory" and "logical memory" are reasonably distinct; rote memory is memory at a very simple level, whereas logical memory is dependent upon associations of meaning. Memory may also be classified with respect to the time of recall. "Immediate memory" and "delayed memory," or "delayed recall," are the two chief types with respect to time. It would be impossible in this treatise to discuss all of these types of memory in bright and in dull pupils, but some features deserve mention. Thus, the bright pupil usually excels the dull pupil in logical memory. Complex associations and large units of meaning are favorite types of material for bright pupils. Simple rote memory makes no great demands upon abstract intelligence and is more adapted to the dull pupil. The dull pupil does not actually excel the bright pupil in the span of units which can be mastered at one effort of memory. Memory of this kind is a simple mental activity which often does not appeal to bright minds. So far as the writer knows, there are no differences between the memory of bright and of dull pupils with respect to comparative efficiency of auditory or of visual rote memory. For example, there is no evidence that auditory memory is the best method for bright and visual memory for dull pupils, or *vice versa.* The relative keenness or receptivity of the ear as compared to the eye is not characteristic of any intelligence level. Bright pupils do surpass dull pupils in delayed recall, especially when they can associate many other factors to assist them.

One more mental faculty is worthy of special consideration with respect to differences in intelligence. That faculty is "reasoning." Reasoning is dependent upon so many other facilities that it can scarcely be considered as a separate faculty, but nevertheless it is always mentioned among the list of mental traits. It is very similar in many respects to general intelligence, in that it makes demands upon the more complicated centers of thought. When a problem in arithmetic is read, reasoning tells us to add or to multiply. The actual reason that we add or multiply is that the concrete conditions of the problem are followed through on an abstract or imaginative level, in the mind. For example, two times three is soon known to be six, without bringing in three pairs of objects to prove it. The young child must have these experiences until he builds up the number concepts, but after those concepts have become familiar, the concrete material is no longer needed. It is also possible to learn that two times three is six in a purely mechanical way by rote learning, but that type of learning does not materially assist the pupil in learning new combinations. However, such rote learning is the favorite method of the dull pupil, whereas the bright pupil prefers to attach meaning to his learning. These meanings function in other problems as well. These principles of reasoning are carried on from simple situations to more and more complex ones, until the superior mind is capable of grasping the factors of a new problem and of carrying them through in the abstract. Bright minds get a vivid picture of what would occur in the concrete. Rignano,[4] in discussing reasoning, says: ''It would seem to be nothing else . . . than *a series of operations or experiments simply thought of,* that is to say, operations or experiments that we imagine performed . . . . and that we do not perform actually, because by a series of similar experiments which have been really accomplished in the past, we already know their respective results.'' A basic mental difference exists between bright pupils and dull pupils in their ability to reason. Bright pupils are able to reason, to anticipate results of new situations, without going through the concrete experiences. Dull pupils lack these powers of accurate reasoning, and therefore, feel the need of the actual material. Mental action is a great time-saver for persons of superior intelligence, but is not a very effective instrument for inferior intelligence. On account of this fact, dull pupils tend to avoid certain fields of thought which require reasoning and proceed through concrete experiences to their desired ends. Bright pupils are on the alert for opportunities to reason, and thus to find a short cut to results. Reason is a faculty by which marked mental differences are plainly disclosed.

''Attention'' is a factor commonly used in characterizing intelligence. It is not a trait or faculty, such as judgment, but is a condition under which mental action functions. Good attention involves steady concentration on the purpose, whereas in poor attention, the object of attention may pass entirely from the mind. The attention of dull pupils is often described as ''very poor,'' that of bright pupils as ''good.'' It is very doubtful whether these observations correctly indicate the natural tendencies of bright and of dull pupils. Dull pupils have frequently been subjected to school work beyond their mental abilities, so that they pay little attention to what they do not understand or cannot comprehend. Work of the proper difficulty, and methods of teaching adapted to the mechanics of inferior intelligence should be given thorough trial before it may be safely inferred that the attention of dull pupils is inherently poor.

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[4] Rignano, Eugenio. *The Psychology of Reasoning,* pp. 81-82. Harcourt Brace & Company, 1923.

When the special mental faculties are given careful examination and study, they appear to be subsidiary aspects of general intelligence, and as such subsidiaries cannot operate to offset general intelligence except within quite narrow limits. They serve chiefly to furnish a convenient terminology to illuminate the operations of general intelligence. To the extent to which they have special effects of their own, they should be studied in reference to those activities. The writer believes that it would be more fruitful to investigate the operations and effects of general intelligence as applied to problems of learning, before attempting thoroughly to analyze special abilities.

CHAPTER V

OTHER TYPES OF DIFFERENCES

Many citations about the differences between bright pupils and dull pupils have been made in the preceding chapters. We think these characteristics express fundamental differences between those two groups, because they are concerned with the operation of the basic psychological laws of learning.

Now, in addition to these differences which are probably fundamental, there are commonly mentioned numerous other differences. These other differences are alleged to be valid; they are very frequently mentioned by teachers and by administrators as if they were as deep-seated and fundamental as any of the factors that have already been discussed. If all of these deficiencies ascribed to dull pupils were actually true, they would present a most discouraging situation. But many of these seemingly inherent deficiencies are probably due to the operation of other causes; the undesirable responses of dull pupils are merely their reactions to unwise procedures. There are at least four main defects in the general program of education which tend to exert unfavorable influence upon dull pupils. These defects will be discussed in order.

The first defect is the lack of proper psychological methods of instruction for dull pupils and for bright pupils, too, so far as that goes. This defect presents a serious problem that has often been overlooked entirely by those who are dealing with dull pupils. Methods of teaching normal pupils require modification to suit the needs of dull pupils. In Part II of this book is a summary of suggestions from classroom teachers which deals with characteristic differences in the methods by which dull pupils and bright pupils learn. The evidence presented by these teachers is overwhelmingly to the effect that methods of teaching must be radically revised to serve the needs of pupils of different types of intelligence. The chief object of this treatise is to emphasize the need of psychologically correct methods of teaching.

The second educational defect is the expectation of achievement on the part of the dull equal to that of average pupils of the same age. It has been quite conclusively established that *mental* age determines to a very large extent the difficulty level at which subject matter may be successfully taught. The average mental age of the dull pupils is at least one year below that of average pupils at the time of school entrance, and it remains below theirs throughout the grades. By the end of the third grade it is eighteen months below; at the end of the sixth grade it is two years below; at the end of the ninth grade it is two years six months below. For a more complete statement of these differences, the reader is referred to Chapter XXII.

A third educational defect is the inadequate provision of courses of study which are definitely adapted to the needs of dull pupils or of bright pupils. These courses of study must deal with topics which are at the chronological age-level of dull pupils, but written at a degree of difficulty which fits their mental age-level. The subject matter must also be expressed by methods which are suited to the psychology of learning of the dull group. Detailed procedures, which are based upon the characteristics such as are shown in Part II, must be provided. When this type of material is available, the teacher will be able to apply her modified methods of teaching in a more efficient way. At present, the teacher must adapt both method and courses of study, which makes her problem doubly difficult. In the final chapter some suggestions are outlined for building suitable courses of study. For bright pupils these factors must be considered, but in the reverse order. That is, the courses of study must be arranged at a higher level of difficulty, but 'stepped down' to the chronological age, and adapted to the characteristic methods by which bright pupils learn.

The fourth educational defect is the lack of proper segregation of pupils so that the first three features listed above, may be carried out in an efficient manner. When a teacher has all three types of ability represented in her room at the same time, she needs much versatility to meet the requirements of all three groups. The range of mental age is a serious problem; the manipulation of three different courses of study is also a problem which offers mechanical difficulties, and the most difficult problem of all is to adapt the methods of teaching to the three different ability groups. In the light of our psychological knowledge about bright and dull pupils, it would require exceptionally resourceful teaching to handle all of these groups, and to use the proper method with each group. In order to meet the needs of this situation, a study of ability groupings is needed by the school administration. School administrators are recognizing the importance of this problem, as shown by the work of Strayer and Engelhardt[5] and of Cubberley.[6]

These four educational problems have not yet been conclusively solved. In systems where they have been studied, they have not been in operation long enough for bright pupils and for dull pupils to show what they can actually do under more favorable conditions. We are convinced that material progress is being made upon all of these problems, and we trust that this volume will stimulate their further study. Until bright pupils and dull pupils have had a fair chance under more ideal conditions, both groups tend to show general reactions which do not conform to the accepted standards for average pupils or to their own abilities. Bright pupils can meet average standards and they are really capable of doing much more. But if they cause no particular disturbance in the school, their real needs are frequently overlooked. Lack of adjustment is especially noticeable among dull pupils, for their inadequacies are so marked that they cannot meet the traditional courses and methods. As a result, dull pupils tend to show many irregularities which may not be fundamentally characteristic of them, but are artificially acquired from the unfavorable environment. Under the present conditions, many of these deficiencies may be incorrectly ascribed to them. A partial list of these doubtful accusations against dull pupils is: "poor conduct," "inclined to truancy," "willfully disobedient," "poor attitude," "lack of persistence," "very excitable," "wasteful of school material," "destructive of school property," "do not study," "not interested in school activities," "prefer to repeat simple material," "poor moral standards," and so on.

If all of these charges actually expressed the characteristics of dull pupils, the outlook for their education, as we have said, would be dark, indeed. Fortunately, it has not been proved that these traits are inherent in dull pupils. These traits are more probably acquired from a system of education which is not adapted to their needs or to their interests. For example, if work is entirely beyond one's ability, a poor attitude is almost certain to result, and this, in turn, may eventually lead to poor moral standards. All such charges should be examined, item by item, with respect to the four major educational defects listed earlier in this chapter, and judgment of pupils should be reserved until better adjustments have given dull pupils a fairer trial. There are doubtless many ways in which dull pupils will show deficiencies and irregularities, even after educational procedures are more perfectly adjusted, but the present list of charges is hardly a fair indictment.

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[5] Strayer, George D., and Engelhardt, N. L. *Problems in Educational Administration,* pp. 490-498. Bureau of Publications, Teachers College, 1925.

[6] Cubberley, Ellwood P. *An Introduction to the Study of Education,* pp. 251-272. Houghton, Mifflin Co., 1925.

Bright pupils present problems of a different character, although they are sometimes accused of the same deficiencies as are dull pupils. Usually, however, teachers laud the excellent qualities of bright pupils. Under the traditional procedures, bright pupils find the school program an easy task and, therefore, have less occasion to be displeased. Courses of study for bright pupils should be made difficult enough so that they make full demands upon the capacities of that group. It may possibly be true that when capacities are utilized more effectively and serious effort is necessary, bright pupils will not spontaneously show such excellent qualities without special training in their development. Under the present circumstances, school is more or less a grand round of pleasure for bright pupils, and this tends to produce a magnanimous attitude in them. But the conditions which adult society imposes are not so ideal; life loses much of its idealism and becomes "the hard outside world." If school work for bright pupils were so altered that it would more nearly approach the conditions of life's competition for such pupils, the education of this group would be much more effective, and the general complaint that schools do not educate would be less frequently made.

These considerations have carried us aside somewhat from the more definite study of school adjustments, but the importance of these factors must not be overlooked in planning the general program of education for bright and for dull pupils.

PART II

DIFFERENCES IN EDUCATIONAL CHARACTERISTICS

CHAPTER VI

GENERAL DIFFERENCES IN SUBJECT MATTER

The preceding chapters have dealt in general terms with qualitative differences between bright and dull pupils. Such discussions have an interesting significance in the field of child psychology. They also illuminate the quantitative mental differences that are expressed in scores on group intelligence tests or as mental ages on individual psychological examinations. But a more important problem is that of interpreting these data in such a way as to make education more efficient and the general social and economic order more satisfactory.

The limits of this study are such that a consideration of more efficient school instruction, only, can be considered. The other problem, that of society's need, should also be studied, but the more immediate problem of modifications of subject matter, and of efficient instruction more properly belong in this volume.

It is rather paradoxical that with so much information at hand about the mental qualities of bright pupils and of dull pupils, so little application of this information has been made to problems of instruction. We know many facts about the mental traits of the dull child, but have been at a loss to interpret these facts in teaching him more effectively how to read, to write, or to spell. It is probably true that the chief reason why transfer of training in the knowledge of psychological traits has not been made to practical teaching lies in the fact that specialists in mental measurement are frequently out of contact with classroom procedures, and that those who are responsible for classroom procedures have little knowledge of psychological qualifications of pupils. The writer feels himself in such a dilemma to a certain extent, but is willing to hazard some psychological suggestions in the field of instruction. This step is made, however, after some years of experience as a teacher, and is further fortified by the written opinions of five hundred Detroit teachers. If these statements are challenged, and if experimental investigations are undertaken to validate them, there need be little apology for stating them in this somewhat dogmatic and categorical manner.

PROCEDURE IN CLASSES FOR SUBNORMAL

As an introduction to the general thesis that the knowledge of psychological traits may be used effectively in instructional procedures, the applied work of psychologists in teaching subnormal or feeble-minded pupils is offered as a suggestion of what may be done. When the education of this special group is mentioned, the very frequent response of teachers and of others is to the effect that this work is a quite special phase of education, that these pupils represent a very small group, and that consequently little or no application of the knowledge may be made to the rank and file of pupils. As a matter of fact, the problem of the special or subnormal class is very closely related to the problem of the dull group, who constitute the lower fifth or fourth of all pupils. The least intelligent pupils of the dull group are removed from the subnormal group by a few points in score only, and a very large number of the dull group have many of the traits of the subnormal in a mild form. If we could strike an even balance between the psychological traits of the subnormal and the normal or average pupil, we would probably describe quite closely the characteristics of the dull pupil. However, our instructional procedures are usually set up so that the average child is taken as the point of reference. If teachers are honestly endeavoring to learn about the traits of the dull group, they will make no mistake in studying the subnormal child, or in becoming familiar with the characteristics of feeble-mindedness.

It is a safe conjecture that instruction in subnormal classes for many years has been more nearly adjusted to the psychological needs of such pupils than has any other branch of instruction. The reason for this effective application lies in the fact that all the knowledge of human nature that can be brought together must be brought to bear in teaching subnormal children. The name and reputation of such authorities as Binet in Paris, and Goddard at the Vineland Training School,[7] are at least known to many teachers, even if they are ignorant of the details of their work.

The minds of subnormal children operate in a slowed up, or retarded, manner. The machinery of their thought processes is so simple or scanty that the teacher can observe and study details which are ordinarily missed in dealing with the average pupil. They are the ''slow-motion pictures'' of the educational world. Consequently, the teacher who desires to instruct dull groups most efficiently will do well to observe subnormal classes and to study the literature of their methods. Hollingworth[8] and Inskeep[9] will be found helpful.

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[7] Goddard, Henry H. *The Psychology of the Normal and Subnormal.* Dodd, Mead Co., 1919. 349 pp.

PROCEDURES IN CLASSES FOR GIFTED PUPILS

In an analogous manner, the instruction in special classes for gifted pupils has a very practical application to the training of bright pupils. The education of the genius has always carried with it an emotional appeal of great import. In this field the work of Whipple, and of Terman is preëminent. Whipple's experiments with gifted pupils at the University of Illinois, and his contributions as chairman of the Committee on the Education of Gifted Children, as reported in Part I of the Twenty-Third Year Book of the National Society for the Study of Education[10] are well known. The more recent studies by Terman[11] on gifted children, made possible by a grant from the Commonwealth Fund, are a very distinct advance in educational knowledge of how to proceed in the efficient education of this gifted group. The same characteristics are displayed in lesser degree by those pupils who fall just short of this most favored group, but who are still classed as ''bright'' rather than as ''average'' pupils.

If such specializations as those just mentioned for the subnormal groups and for the gifted groups had never been perfected, there would be less incentive to undertake a discussion of bright or of dull pupils. But, since both extremes in the scale of intelligence, representing about two percent in each instance, have been studied so thoroughly, and since effective means for their instruction have been evolved from such studies, the problem of making the less marked adjustments for the dull and for the bright, both of whom differ to a lesser degree than the idiot or the genius from the average, does not appear to be outside of the limits of possible realization. Without such guide posts which mark clearly the extreme limits of educational deviation, the venture into these lesser fields would perhaps seem hazardous, whereas, under the circumstances, it can scarcely be called a dubious attempt.

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[8] Hollingworth, Leta. *The Psychology of Subnormal Children.* The Macmillan Company, 1920. 288 pp.

[9] Inskeep, Annie. *Teaching Dull and Retarded Children.* The Macmillan Company, 1926. 455 pp.

[10] Published by the Public School Publishing Company, 1924.

[11] Terman, Lewis M. *Genetic Studies in Genius,* Vol. I, Stanford University Press. 1925.

Present Sources of Applications

In adjusting courses of study and methods of instruction to bright pupils and to dull pupils, three sources of help are at hand: first, the first-hand observations and experiences of classroom teachers; second, the knowledge of qualitative psychological traits that specialists have developed by methods of mental examinations; third, the application in modified form of the knowledge about the traits of subnormal pupils and of gifted pupils.

The possibilities of the third source have been discussed, we hope, with sufficient emphasis to warrant a more serious attitude with regard to it than has formerly obtained. The second source will depend for its successful use on the one hand upon the ability of the teacher to understand and to apply these characterizations, and on the other hand upon the ability of the psychologist to verify and to parallel his conclusions with the classroom experiences which are reported by teachers. In this connection, it should be remarked that progress has been made by both sides, to the mutual benefit of both parties.

The first step, or the contributions of the teachers, is probably the major factor in this entire plan of reorganization. In the last analysis, what the pupils actually do is a safer guide for adjustments than any purely hypothetical theories that are carried over bodily into practice. The methods of teachers have probably been inaccurate and inefficient in some instances, but that is no disparagement of the general contributions that have been made. On account of lack of adequate knowledge of these problems in the training of teachers, they have been left to their own resources. But teachers generally are quick to learn by trial and error, and their resourcefulness and versatility guarantee a sane development of correct techniques along original lines. Their remarks, their observations, and their conclusions have been received and carefully considered;

on them is based, indeed, the bulk of this treatise. It was very remarkable, in fact almost uncanny, to find that so many teachers agreed substantially in their descriptions of the ways in which they modified procedures for bright or for dull pupils. In order that notes should not be compared too easily and thus lead to similar statements, the teachers who were asked to contribute were so selected that not more than two or three taught in the same building, and in such instances, they did not teach the same subject matter.

Teachers must be urged, in describing their procedures and techniques, to present details which they use almost subconsciously in their daily routine. In fact, many efficient and clever teachers have an array of original devices which they do not realize are not the common possession of all teachers. If they can be induced to explain what seems to them obvious and commonplace, the sum-total of such details makes a rich, suggestive program for any teacher. The most useful reports were received from teachers who understood and applied this principle most thoroughly.

After these details have been consolidated, they may be compared with the general mental characteristics of the groups in question; afterward, they should be studied and verified by the observations of the psychologists. The educational traits and characteristics add meaning to our knowledge of the mental characteristics of the pupils. The suggestions from the classroom which meet and coincide with the psychological hypotheses may probably be accepted without much further verification. If cases of definite disagreement occur, both parties should re-check their conclusions in the effort to arrive at an agreement. For example, if pupils appear to be good in conduct when undergoing the administration of psychological examinations, but are poor in conduct in the classroom, the generalization ''poor conduct'' should not be accepted by the teacher until she determines whether the difficulty of her work may not be the determining factor. Final decision as to behavior should then, of course, be deferred until this defect in instruction has been corrected. However, if ''poor conduct'' were reported by both teacher and psychologist, under varied conditions of experimentation, it would be a fairly safe generalization that ''dull pupils are usually poor in conduct.''

LIMITATION IN SUGGESTIONS OF SUBJECT MATTER

The reader who turns to the following chapters will possibly feel a distinct disappointment in not finding a complete guide for procedure in each school subject. The physical limitations of space would scarcely permit such a treatment in this volume. There is also an added reason in the fact that the writer, in coördinating these reports, does not wish to have the inference made that he is an authority on subject matter. The real work of presenting detailed methods in each course more properly falls upon the supervisors in charge of the respective subjects. These details should include a long series of practical suggestions of a general nature for that subject, to be followed by further details on actual steps in the processes of learning. The development of the steps of two-place multiplication for dull pupils, or the addition of fractions for bright pupils, are samples of these problems. When such studies are eventually completed by supervisors, the discussion on each subject should be much longer than the entire discussion presented here for all subjects.

The contributions of this study are limited to general statements in terms of psychological characteristics and to brief statements about subject matter in most of the elementary-school subjects. The presentation is intended as a foreword on techniques for such procedures, rather than as any final contribution. Resourceful teachers and school administrators, by studying the traits that are discussed in all the school subjects, rather than in one special subject only, should find many practical points that will be helpful in any one subject.

In compiling these descriptions of the performances in subject matter, the writer was constantly impressed with the fact that the characterizations of dull pupils in one subject were very similar in type to those in all the other subjects. Although the material under consideration was radically different in detail, the responses of dull pupils were very much the same in all instances. This observation leads one to believe that the suggestions as to any school subject are more valid as a result of this common background of characterization. The responses of bright pupils in the different school subjects follow the same laws, and lead to the same deductions. With these suggestions and limitations in mind, the statements with respect to subject matter will now be presented.

SECTION A. LANGUAGE

CHAPTER VII

READING

Dull Pupils

The weaknesses and limitations of dull pupils are quickly discovered when they learn to read. Reading is usually the first formal school work. The poor school progress of dull pupils is very commonly described in terms of reading, just on account of its early incidence. If pupils fail in first-grade reading, it usually also means failure to make the grade promotion.

It is seldom that a child makes much progress in reading until he is mentally about six years of age. About twenty-five percent of first-grade children are less than that level of mental maturity at school entrance; indeed, many of this group are still below that level at the end of the first year of school. This situation explains the high percentage of failure that has been common among first-grade pupils. From twenty to thirty percent failure has been frequently reported by many school systems.

If we remember that failure has a discouraging effect, and that attempting to do work beyond the proper mental level tends to produce nervousness, it is evident that some serious malpractices have been exercised upon dull pupils at a very early age. There is need of deferring formal reading for these pupils until a later period than is common. Instead, preliminary work should be given in experiences which are basic to reading. Dramatizations, animal study, etc., are useful means of developing such a pre-reading background.

In addition to difficulties in the general reading procedures, the controversy in recent years as to the relative value of silent reading and oral reading has affected the reading of dull pupils. The pendulum has gradually swung toward more silent reading. In the days of oral reading, dull pupils were discovered more easily on account of incorrect oral expression. But oral reading was frequently no more than word-calling, and dull pupils with special abilities for word-recognition were able to make fictitious progress.

It mattered very little if they did not comprehend what they read. With the change to silent reading, dull pupils have been able to escape detection, not only for comprehension but also for word recognition. Whenever comprehension is recognized as a problem of special significance in silent reading, the reading ability of dull pupils is found to be very inadequate.

Dull pupils are inclined to be more interested in the mechanics of oral reading than in reading for comprehension. Encouraging dull children to think is a very great problem. These considerations suggest the importance of a proper motive for reading at its earliest stages, before dull pupils get the habit of word-calling established. Modern reading methods have been devised with the major objective to stimulate reading for comprehension. In carrying out this worthy aim, so many physical and manipulative elements have been added to reading that dull pupils find reading too complicated for mastery. They often become completely absorbed in the process itself.

The writer believes that a little more moderation in these respects would be a better way to use these tools. Dull pupils need to have *some* concrete material at hand in order that they shall read for comprehension, but it should be used as a means to an end, not as an end in itself.

Units of beginning reading should be very simple and very definite. These units should be constantly repeated and reviewed. Drill by rote should find a large place in the teaching of dull pupils. Drill is necessary for a proper fixation of useful bonds. A few words and phrases, mastered to a fair degree of control, will do more to establish correct habits and proper attitudes toward reading than the skimming of an entire primer in a hazy and haphazard way. When they are allowed to make free choice of reading material, dull pupils re-read simple stories, whereas bright pupils prefer to exert themselves on new and unfamiliar material.

Oral reading may be used for dull pupils as a sure means of detecting mechanical difficulties. We doubt that dull pupils ever become so proficient in reading that the oral reading lags very far behind their natural rate of comprehension. Of course, silent reading should be encouraged for all groups of pupils, but teachers should endeavor to discover whether or not reading is actually mastered under such conditions.

Among the various procedures for teaching reading, the use of phonetics has been quite common. Phonetic methods imply the ability to generalize upon words and build up many complicated associations. While this type of teaching may produce effective results for bright pupils, the benefits for dull pupils are very doubtful. Dull pupils are not able to make the needed associations, so that phonetics becomes for them a confusing and extraneous element. The use of rhymes to teach new words is a principal device for one well-known system of reading. We have observed dull pupils struggling with such units which were so long that the rhythm was lost, and hence the entire value of the plan was defeated. While such a procedure may be valid in principle, its application should be so simple that the value is actually realized.

Reading by dull pupils is very liable to be characterized by word-calling, rather than by rhythmic comprehended units. The only safe way to overcome word-calling is to have reading material in short, easy units, with a limited vocabulary of simple words. The content of reading should be chosen from fields which fall within the social interests of dull pupils. A dull post-adolescent pupil fourteen years of age does not willingly read the material for *children* at the eleven-year level, but he is often forced to choose it because no really suitable material is at hand. It is not to be wondered at that dull pupils do not take a more spontaneous interest in reading in view of the many mal-practices that are witnessed in their instruction.

Bright Pupils

Bright pupils have a mental age above seven years at the time of school entrance. Many of them are able to read quite well from a primer before they enter school. The serious attempt of many parents to discourage this tendency often meets with failure, and superior minds grasp reading without formal instruction.

In order to meet this situation in school, bright pupils are usually required to begin with what they already know, or they are given an extra promotion into the next grade and thus miss certain steps in which they are not well grounded. A special type of reading procedure is needed for them—one which will recognize their previous accomplishments and rapidly take them to the point where the new material begins.

Bright pupils have a natural interest in reading. They read for comprehension. The mechanics of reading seldom become the center of attraction. The mechanics are mastered because control of these elements is recognized as a means to a purposeful end.

They seem to learn reading by any method that may be devised, or rather they seem to learn *in spite of* the method. Methods that have appeared to be effective for them have, accordingly, often been mistaken as a sure means of getting efficient results with any type of pupil. The application of such methods to dull pupils has often proved extremely disastrous. Then the pupils, rather than the method, have been blamed.

Bright pupils get control of enough words to read independently at a very early age. They have already had many experiences and are capable of applying the new avenues of expression to the familiar situations. When new words are found, they are able to determine their meanings quite accurately from the context and are not at loss how to proceed.

The motivation of reading for bright pupils should be a very minor problem for the teacher. They read incidentally from newspapers, advertisements, and posters. They realize that they gain a great power over the sources of information, and this makes them more independent at an early age.

It has just been said above, that many bright pupils have mastered the initial stages of reading before school entrance. For those who have not reached this point, the introduction to reading should be made with situations which call for comprehension. This principle is grasped at an early date. When it has been mastered, the mechanical elements should be eliminated as soon as possible. Stress on the mechanics of reading merely impedes progress and tends to destroy the natural interest in reading. Bright pupils read many primers and first-grade readers. They gain mastery by reading a very great amount of simple material and acquire an enriched vocabulary by their wealth of experience.

It is of very great importance that bright pupils should be allowed to develop their silent reading at an early age, for there is little doubt that their comprehension is much more rapid than their oral expression. Special methods and devices which seem to get successful results may actually have little to do with it, and bright pupils should not be burdened and hampered by any process whose validity has not been established.

The real problem of teaching reading to bright pupils lies in the availability of suitable material. Success in reading comes by allowing bright pupils much freedom to go ahead for themselves. There is a very great need of reading material about topics at a relatively immature social and physiological age, which are written in the vocabulary and comprehension units of, a more mature mental level. Reading is a very commonly used tool in school procedures. It is very valuable in affording means of enrichment of courses for bright pupils. It typifies mental activity, which is the natural outlet of bright minds.

CHAPTER VIII

SPELLING

There have been many erroneous impressions about the relationship of spelling ability to general intelligence. Some investigators have declared that intelligence and spelling are not related at all. Sometimes persons of superior intelligence have pointed out, with a sort of false pride, that they are "poor spellers." Most of them actually rate very high on a general spelling test; they base their statements of disability upon a few 'catch words' rather than upon their general ability to spell. The writer is convinced that a high positive correlation exists between general spelling ability and general intelligence. The evidence in the following discussion testifies to the correctness of this conviction.

Dull Pupils

The fact that dull pupils can be induced to engage in routine drill upon words which bright pupils refuse to undertake, should not be confused with ability to spell. Dull pupils enjoy routine drill and bright pupils find little intellectual or practical value in it. Merely reciting the letters of a word in a certain order or writing them many times is mental work for dull pupils, but it is so mechanical as to offer no mental content for bright pupils.

Dull pupils learn to spell by rote. They depend upon frequent repetition as their chief tool of learning. Since this method requires a great amount of time and patience, the number of words which dull pupils may be expected to learn to spell is quite limited. A few words spelled correctly are a greater asset than a large number of words learned in a careless haphazard manner and with a low percentage of accuracy. Because dull pupils learn poorly and forget quickly, it is important to have drills upon words repeated at frequent intervals. What is contained in a shallow vessel soon evaporates. Continual replenishment must be provided.

Dull pupils find rules or exceptions to rules of little assistance in learning to spell. They cannot make the proper applications, and hence such aids do not really assist them. Special rules, little devices, short rhymes, and the like, may be confusing. The association cues themselves are liable to be misunderstood and, therefore, produce erroneous results. For example, a bright pupil may hit upon the spelling of "Chicago" as the cue to the correct spelling of "chief," but if the dull pupil tries this plan he may forget what word is the cue, and if he does recall the cue word, he may not remember how it is spelled, so a great deal of energy is wasted. The direct method of learning by repeated drill is a much safer procedure. Dull pupils do not find such methods monotonous if the drill periods are short enough so that fatigue does not occur.

These simple and direct methods are suitable means of procedure for dull pupils in view of the fact that they need to master, and are able to master, only a limited list of words. The actual reading or writing vocabulary of dull individuals in adulthood is very small, indeed. The poorest twenty percent in intelligence probably know the correct spelling, on the average, of not more than 500 or 1,000 words. This number probably approximates the actual limit they are capable of attaining, so there is little use of setting their standards at a much higher level. One specialist in spelling argued with the writer on this point, to the effect that since the bright individual will use more than this number of words, his stenographer, who presumably is less gifted, must learn to spell that many words so as to serve him efficiently. There are several fallacies in the argument. The most obvious fallacy is in assuming that dull individuals ever become successful stenographers. The second is, that granted that such individuals might be capable of the general training for stenographers (which is extremely doubtful), the fact remains they would be unable to master the necessary spelling to make them efficient. As a matter of fact, stenographers must have high intelligence to be successful. The practice of shorthand calls for interpretations which must be constantly made from the context and dull minds are unable to supply these gaps in reproducing from dictation. Dull pupils spell inaccurately, even when writing or typing from copy. They do not observe closely and they trust to their own judgment, instead of following the model. A characteristic instance was noted by the writer a few years ago when a clerk of doubtful ability typed a list of spelling words for him from copy, yet spelled many of them wrong. There is little or no use in setting up theoretical objectives in subject matter for dull pupils without ascertaining if those objectives are capable of being mastered and are necessary for success in life.

Bright Pupils

Bright pupils like to spell correctly for the sake of doing things correctly. They feel that incorrect spelling in social correspondence is somewhat of a disgrace. These motives are powerful incentives for the spelling of bright pupils.

They do not find the routine methods, which are used for dull pupils, suited to their needs. There is little mental content in doing things by rote. They generally try to excel in spelling, not only in the formal spelling lessons, but in all other school subjects as well.

In the process of learning to spell they are very much interested in numerous devices, rules, and associations which enable them to remember different words. These aids to instruction may seem to be so cumbersome as to serve only a doubtful purpose, but they usually produce excellent results. A bright pupil writes a word once; he then studies the relationship of the letters, inspects the word for its possible similarity to other words, thinks of the meaning of the word, knows what part of it offers the greatest difficulty and adjusts his attention to the task of remembering it in accordance with the very best judgment he is capable of making. A certain minimum of rote drill may be required of bright pupils, but they are apt to feel a mental revolt against too much insistence upon a method which is unnatural for them and out of harmony with their ways of thinking. Bright pupils will be found drilling themselves on difficult words at unexpected times when they find that drill is necessary.

The enrichment of the course of study in spelling is an important need for bright pupils. Most of them complete the high-school course and about one-half of them go through college. They enter the professions where a large spelling vocabulary is demanded. Spelling should not only be taught in the elementary grades, but also carried into the high-school courses in a modified form. The older types of spelling books were built in part upon a sound principle in that they provided a large list of words. Those words were difficult and exceptional, so that they were not very suitable except for very gifted minds. The natural reaction to this practice was to discard the old book for minimal lists which do not provide enrichment for bright pupils. Spelling, therefore, offers a very legitimate field for the enrichment of courses for bright pupils.

The recent revival of the old-fashioned 'spell-down' is quite out of harmony with modern theories of spelling. Spelling is almost never used except as a tool in writing. Oral presentation seldom calls for the spelling of words, yet this ancient method has been renewed by the old-timers whose experiences in education were radically different from those of the present generation. No doubt these contests do stimulate some interest in spelling, but those who are really interested are a selected group with high intelligence. The winners of such contests are not only excellent spellers, but they also possess a very high degree of emotional control to withstand the strain which comes from the contest. The real 'champion speller,' in the writer's opinion, is one who is able to spell correctly in writing, from dictation, the largest number of words of a carefully graded list which is easy enough to allow many to start and difficult enough to baffle the very best at the finish. However, this psychological procedure is not in keeping with the more spectacular methods which the press of the country considers necessary. The spelling champion of Detroit five years ago had an I.Q. of 146; a more recent champion had an I.Q. of 115. Both of these pupils were obviously much above the average in general intelligence.

CHAPTER IX

HANDWRITING

In the evolution of methods of teaching which have been carried out for many generations largely by trial and error, procedures and techniques have gradually been established as a result of long experience. In some school subjects these methods have drifted toward methods adapted for bright pupils. This development was due to the fact that only the better types of intelligence were enrolled in any schools. In other subjects the tendency was to specialize upon dull pupils. While courses were not developed and consciously planned for particular types of intelligence, we are able to see their relation to these groups in our modern system. The central tendency was probably aimed to meet the needs of the average pupil.

DULL PUPILS

Methods of handwriting were developed that were more suitable for dull pupils than for the other groups. Underlying this situation are three facts: (1) There is a common belief that efficiency in handwriting does not correlate positively with general intelligence. (2) Handwriting does not appeal to bright pupils on account of its limited mental demands. (3) Great emphasis has been placed upon the mechanical side of handwriting. Each of these statements needs elaboration.

Efficient handwriting and general intelligence have not been well correlated in the past because the methods of teaching did not appeal to bright pupils. The teaching of handwriting has stressed the mechanical phases at the expense of the intellectual interest in that subject. Because the act of handwriting is quite devoid of contextual intellectual stimuli, it naturally does not appeal to bright pupils. Finally, great emphasis has been placed upon the mechanical acts of handwriting in efforts to get the desired results.

In the mechanical execution of handwriting, dull pupils are naturally less well adapted to perfection than bright pupils. The reason for this defect lies in the fact that they are less capable of fine muscular control. In all types of motor tests, superior pupils excel dull ones, although this outcome is contrary to the commonly accepted idea. Dull pupils are relatively inferior in motor skill. Indeed, the defective muscular movements of the lowest grades of intelligence, those who are feeble-minded, are so inadequate and so faulty that very poor muscular coördination is accepted as one index of mental deficiency.

Teachers have been vaguely aware of some such deficiencies in handwriting, and in order to remedy them have built up elaborate systems of formal drill. The application of such intensive drill to average pupils or to bright pupils who do not stand in need of it, reacts in unfavorable ways. Drill is needed for dull pupils, but it should not be carried on so intensively that it produces fatigue. Perfect copy should not be required or expected, but a fair standard should be established, after careful experimentation has determined what proficiency may reasonably be demanded.

Dull pupils do find a certain mental demand in the mechanics of handwriting, but that mental activity is so slight, in bright pupils, that it scarcely rises to the level of conscious attention. Because of this mental content, which is very little above the level of reflexes, dull pupils are quite well pleased and entertained in the very processes of handwriting. If it were not for this, handwriting would become as meaningless to them as it often is to other groups. The work which society finds for these groups is very similar to this mental activity and probably makes enough demand upon them to afford satisfaction in the act of performing it. Superior minds are unduly and unnecessarily worried about the mental monotony of unskilled occupations. The fears which they entertain would doubtless be realized if they themselves were forced to enter similar occupations, but this condition is seldom realized and for the workers actually in those fields the difficulty does not exist.

Dull pupils need close supervision in handwriting. This need arises from their inadequate powers of independent work and lack of correct self-appraisal. They fall into many incorrect habits, such as mirror-writing or beginning certain letters or numbers in the wrong direction. They confuse their ‘‘p’s and q’s,’’ their m’s and n’s, their h’s and k’s. If not carefully supervised, some of these errors become fixed. It is true that bright pupils make similar mistakes in early stages of handwriting, but they are so accurate in observation that usually they soon correct themselves.

The "purpose" of handwriting for dull pupils is the act of writing, itself. The message which writing is intended to carry is largely an incidental matter with them.

Bright Pupils

Many of the psychological factors that should make bright pupils more proficient in handwriting have been ignored or underestimated in the practises that have been used.

Bright pupils find little or no interesting mental content in the physical act of handwriting, itself. The intellectual stimulus for their writing comes from a desire to make writing transmit a message. If bright pupils are expected to copy one simple sentence for a whole page, the task does not appeal to them. They may do it in a docile and polite manner, but such a practise tends to breed a lack of general interest in school work and in handwriting in particular. They naturally respond in a better manner if they are encouraged to write something which has variety from sentence to sentence and which actually transmits a message or information. There are many school activities which require handwriting, and these tasks may very properly be assigned to them.

The motor control of bright pupils is usually excellent, so that they do not need very much drill on fundamentals. They easily meet the specified standards; indeed, these standards often are not high enough for them. There should be very little hesitation about setting a much higher level of performance for bright pupils. A minimum of formal drill would cover this enrichment of their work. Standards of speed and of accuracy might very well be placed upon a very high plane of efficiency. Handwriting is a very important tool for superior minds. In spite of the many modern conveniences in communication, handwriting continues to hold a considerable place. It might easily become a mark of culture and ability as well. The ability to take notes on lectures and from books in high-school or college in an easy manner would be a great asset. The number who are able to depend *entirely* upon mechanical aids, such as the typewriter, is comparatively few.

Bright pupils become interested in handwriting if worth-while projects are carried on by the teacher. For example, one teacher reports that a scrap-book was prepared on the evolution of handwriting which contained a valuable set of specimens by the races of mankind, by periods of time, and by countries. If handwriting is taught along the general line of these suggestions, bright pupils should excel in handwriting.

It should not be assumed from this discussion that bright pupils should not be required to do a fair amount of routine drill to increase their general efficiency. There is a certain value in requiring all pupils to acquire persistence in school work. Bright pupils have legitimate grounds for rebellion if *too much* routine drill is expected. It is more likely true that if handwriting is properly stimulated by intellectual motives, bright pupils will control the amount of drill they need with very little suggestion from the teacher.

CHAPTER X

ENGLISH

The term "English" is a subdivision of the general topic of language, as applied to English-speaking peoples. As a subject, English may be divided into several parts, of which grammar, composition, and literature are the chief.

Language is the chief means of communication of the human race. It is the most effective vehicle of intelligence. Language is, therefore, one of the best evidences of intelligence. It is one of the best means of determining the abilities of bright and of dull pupils.

DULL PUPILS

Dull minds use language in its simplest forms. They have a limited vocabulary, adequate enough to give expression to their relatively simple thoughts and experiences. At the lowest level of intelligence, the idiot is able to use only grunts and cries; the imbecile uses simple words, or very short phrases; morons, the highest type of feeble-minded, are capable of using simple sentences. If the opportunities for the use of language are equal, the intelligence of a pupil may be judged with a fair degree of accuracy by his mastery of language.

The vocabulary of dull pupils is so limited that they are at a distinct disadvantage in traditional school procedures. The words of printed texts and courses of study, as well as the vocabulary of the teacher, are often beyond their ability. They are forced to read or to listen to school work which is intended to explain, but on account of the limitations in language, the educational tools themselves do not fulfill their proper function. Instruction is supposed to be couched in such simple verbal terms that mastery of the subject matter is the chief problem, but in the case of dull pupils the terms themselves present a problem in the usual course of study. There is no danger of placing too much stress upon this important point, of using too simple phrases and terms. Dull minds have a tendency to make very simple mental associations, and therefore the words which symbolize those associations need be but simple.

The vocabulary of dull pupils is limited to a surprisingly small number of words. These few words are coördinated into phrases or into sentences whose construction is of a decidedly elementary character. If a careful examination is made of the structure of their composition, this tendency toward short units will be disclosed, even when these units are not separated in a logical manner, but are written into one very long and unpunctuated sentence—one which might be more properly classified as several sentences. When long, complicated sentences are used, dull pupils do not grasp the meaning of the entire sentence. As a result, some part of it is not understood, and erroneous impressions are conveyed. Few of the traditional types of textbooks could be recommended for dull pupils, on account of these sources of difficulty.

Dull pupils have great difficulty with the rules of grammar. Rules have been developed to such a point that grammar easily becomes an abstract science. There is an inherent difficulty for dull pupils when they struggle with abstract conceptions. They have not mastered the concrete experiences to such a degree that the abstract can become symbols of the concrete, as have bright pupils. The construction of simple sentences may be readily understood, but the use of modifiers, especially when more than one simple modifier is inserted, is exceedingly difficult for dull pupils. Grammar is such a complex subject that, although bright pupils have studied it in the elementary school, even they often declare that they do not really understand it until they take up the grammar incident to foreign language study in the high school. For dull pupils, these later aids are seldom realized. In the early stages of language instruction, dull pupils are more interested in using words than in the rules for the correct uses of words. A series of basic facts and principles should be emphasized through habit formation, as this procedure is more effective than attempting to begin with the abstract and the general to proceed from that to the concrete by the application of these principles. The direct work with the concrete is much more effective.

The appreciation of literature is an important educational problem for dull pupils. The limitations of vocabulary and of comprehension which have been discussed above render the real understanding of literature quite impossible. Literature that is simple and direct, is effective literature for dull pupils. A few great writers have not lost their reputation by writing in that style. In fact, they have made literature by the use of simple expressions. The educational aims of literature are to read for culture, to seek information, and to develop correct forms and style; but unless 'literature' is at a very elementary level, none of these aims is realized by dull pupils.

Nevertheless, literature may perform a great service for dull pupils, if it is translated into a form which is comprehensible. Topics of importance to the social development of dull pupils must be written in vocabulary and in units of thought which may be understood by immature minds. Literature which deals with post-adolescent interests at a pre-adolescent mental level is one of the greatest needs for dull pupils of that particular period of life. The real hope of uplifting the lives of dull pupils is by bringing the best literary works down to their level, instead of trying to raise the pupils to impossible heights.

The principles upon which these instructional needs are based are very elementary, but the application and transformation of language into workable forms is a task of considerable magnitude.

Bright Pupils

Language is the chief medium in which bright pupils disclose their mental superiority. They acquire rich vocabularies and comprehensive units of thought and of expression. Language is the easiest means of transmitting information of a complex nature, and bright pupils learn to take advantage of this fact in an advanced way.

Grammar is readily understood and its usefulness is thoroughly appreciated. The rules of grammar are correctly applied to composition with effective results. Grammar is the theory of language. Bright pupils are always seeking for theoretical reasons in all phases of education, and so grammar offers a fine opportunity for bright pupils. The writer does not hesitate to recommend a great amount of formal grammar for this favored group.

In the field of composition bright pupils show many evidences of excellence. They understand simple expression. But in addition to this feature, which, although of an elementary nature, is not necessarily the product of dull minds, they are capable of presenting ideas in a complicated form, whose purpose is not to confuse, but to express finer shades of meaning. They are competent to devise an outline for a story and place the steps in a logical order. The plan of their thinking is logical. From such an outline they are able to develop a composition into one coherent and meaningful unit. The very complexity of the entire process affords a mental appeal which does not baffle them, but rather pleases them decidedly.

Literature, in all of its advanced forms, is a source of value for bright pupils. It represents the results of mental achievement of a very high order, and, therefore, has a message of real merit for superior minds. They have keen powers of imagination, so that they can live in the scenes that are described. Their own wide experiences are brought into play in literary interpretation. The vocabulary of good literature is not beyond their comprehension, and the thought units are capable of being grasped. The mechanics of reading for meaning, offers practically no difficulties and, therefore, the direct path to understanding is unhampered. The field of literature offers unlimited means of enrichment of the course of study for bright pupils. Its use should be cultivated intensively.

Bright pupils enjoy writing original stories and should be encouraged to do so. They produce clever original poems. They are capable of producing a yearbook which is valuable for the school they are leaving. The development of linguistic talent in bright pupils is a most desirable aim in language teaching.

They need material at their own age level, but it should be written in vocabulary which challenges their intellectual abilities and which must actually be at a higher level than their social interests. The capacities of bright pupils for expression through language is almost unlimited. Schools should not hesitate to capitalize the language abilities of bright pupils to an advanced degree of thoroughness.

CHAPTER XI

LIBRARY

There is probably no school activity in which the physical aspects are supposedly more overshadowed by the mental significance than in the use of the library. It is true that the physical or mechanical aids have a purpose but that purpose is useful only in finding the material that is needed.

Dull Pupils

Dull pupils are very prone to allow their interests in the library to fall short of the important goal and hence get little farther than the 'machine' part of the program.

They come into the library with a rush and appear to be bent upon a very definite purpose. Their haste to arrive is hardly warranted by what happens after arrival. If left to themselves, they wander about among the shelves and pick out a book with a bright-colored binding. If it has plenty of colored pictures, it carries an appeal; but if there are no illustrations, it is soon discarded. This claim of visual appeal need not be denied dull pupils; it may be used effectively with material suited to their needs. But such desires are merely squandered in undirected entertainment, they serve no useful purpose. If the dull pupil can be guided to do some constructive thinking about his visual impressions, the result should be worth-while educationally.

They look for books in terms of size, color, or position on the shelf, rather than by catalogue number. Their inquiries about books are usually stated in a vague, indefinite way, such as "a book with a story about two little girls." They enjoy assisting in the library in putting books away, but their activities must be closely supervised or few books will be put in their proper places. They do not grasp or understand alphabetical sequences, and if they do master the arrangements of the initial letters of words, further refinements such as sub-arrangements within each family of words which have a common initial letter, are often baffling.

When dull pupils are required to do reference work, they disclose their greatest weakness. They are unable to select the essential facts and, therefore, substitute for those chief points, a large amount of minor details. The very act of note-taking furnishes the chief substance of their mental activity, instead of the analysis of the points under consideration. They rarely finish their assignments because they fail to apportion their time or apply their energy to best advantage.

The real function of the library is often defeated for dull pupils. That function is to find books suitable to their reading, both for information and for recreation. These desirable habits are intended to be so well established in school that they will carry over into life-situations. The dull pupil falls short of realizing these goals in the library on account of two main reasons: first, the books with topics that should naturally appeal to their interests are written in a vocabulary that is beyond their comprehension; second, the books with vocabularies and thought-units within their comprehension are written to appeal to children much younger, and hence their social and vocational interests are not reached. Dull pupils usually choose the second type of book as a lesser of two evils. Fifth-graders are found reading second-grade and third-grade readers. The type of book adapted to others of their grade becomes discouraging when difficult words are met, so they develop habits of guessing, of skipping portions, and of skimming books that merit careful study. These conditions are most deplorable. However, few books have been written that fulfill the requirements for dull pupils, and the efficient library teacher will find her greatest service in selecting books suitable to these needs.

The favorite reading of dull pupils is the sensational, cow-boy, or bandit type. It is probable that writers of such books have adjusted their writing to less mature mental levels; they have been doubtless forced to do so in order to attract a sufficient reading public to make their efforts profitable. Perhaps these writers are not themselves capable of using "words of more than one syllable!"

If some of these difficulties could be adjusted so as more nearly to meet the habits, attitudes, and desires of dull pupils, these individuals, in adulthood, would not lose all interest in intellectual recreations of life.

Bright Pupils

The library furnishes a natural intellectual recreation for bright pupils. They have a keen interest in intellectual activity and probably get a greater enjoyment out of the library than from any other school project.

They come into the library quietly, look for the books they need, by title, or by reference number. If they do not find the books, they understand the mechanics of the card-catalogue and waste very little time in getting what they actually want. Since they are interested in what the library gives them, they take pride in the general neatness and order that prevails.

Bright pupils are resourceful in managing their library work. If they do not find the particular book in question, they search the sources and select an alternate that serves almost as well. They like to prepare a bibliography on a special topic and generally display surprising originality and resourcefulness in doing it. They take notes and make abstracts well. These traits are a result of their ability to generalize and to analyze the essential issue in a situation. Such psychological traits are characteristic of superior minds, and the activities of library work are expressions of these natural gifts.

Bright pupils know what they want and they often exercise a great deal of freedom in reaching their goals. These activities are sometimes mistaken for malicious attempts at disturbance, and accusations are made which work a moral hardship and injustice upon minds with ultra-sensitive standards. In this same connection it should be noted that the natural desire of bright minds to share in a social way the experiences which they get from books, leads to frequent and unexpected interruptions of other pupils or of teachers. Again, these traits are guided by no mischievous motive and can be dealt with by reasonable control. Fortunately, modern education is becoming more accustomed to having pupils show some initiative and interest and, therefore, the desire for individual expression is no longer a novelty.

There should be mentioned one problem of library instruction for bright pupils, similar in nature to that for dull pupils, namely, the problem of finding material suitable to their mental level, but dealing with topics at their own chronological age-level. While bright pupils can master the intellectual content of advanced work, they would undoubtedly derive greater benefit from it if they delayed studying it until their natural social interests fall in the same place.

Enrichment of the bright pupil's courses of study throughout their entire school career is a very important function of education. The library probably offers the greatest source of enrichment in all school studies. Consequently, the more nearly the use of the library is suited to the needs of bright pupils, the more likely it will be that true enrichment of education for these groups will be assured.

SECTION B. EXACT SCIENCE

CHAPTER XII

ARITHMETIC

The concept of number is a characteristic development of human intelligence, though, except in elementary forms, it was probably not understood or employed by the human race until a comparatively recent period. The simple process of distinguishing between one and two represents one extreme in mathematics; such abstractions as the theory of the fourth dimension represent the other extreme. While numbers may have meaning for very concrete and simple situations, they also lend themselves to abstractions so complicated as to baffle the genius.

DULL PUPILS

Somewhere between these extremes, the minds of dull pupils reach their limit in comprehending arithmetic. This limit is probably somewhat lower on the arithmetical scale than is generally supposed. An indication of the 'breaking point' between success and failure is the fact that dull pupils may master the tables of the fundamental operations of rote learning, yet immediately afterward fail in reasoning out for themselves the procedures in problem solving.

Dull pupils, in dealing with fundamental operations, show many unique methods of work which are not characteristic of other levels of intelligence. They break numbers up into smaller units and lose track of what they are doing. They are observed to jot down many small sub-totals here and there, and become confused as to the correct one to apply. They use 'crutches,' such as counting on their fingers.

They are very apt to be confused on steps in the fundamental operations. The writer has observed many dull pupils in action. They subtract 'down' instead of 'up.' They are at a loss to estimate quotients. They do not master the treatment of partial products in two-place multiplication. In this last process they are apt to multiply the partial products together in some manner on account of their faulty notion that multiplication is the process under consideration.

In problem solving dull pupils disclose their greatest arithmetical weaknesses. One reason lies in the fact that their inadequate imaginations do not permit them to translate the conditions of a situation into a concrete and practical problem. A further reason lies in their limited powers of analysis. They add together all the numbers in a problem without reference to the terms that are involved. They frequently multiply, giving as a reason that they "need a larger number for an answer." The uses of special devices, short cuts, etc., are of doubtful value in teaching dull pupils, since these very devices themselves may not be understood or their application comprehended. As a result, there is only added confusion.

Mastery of the simple combinations in the four fundamental operations is comparatively easy for dull pupils. Rote learning, by many repetitions of simple units, perfects knowledge of these combinations. Dull pupils require drill and repetition to fix their impressions. The constitution of their nervous system indicates that new bonds or learning connections are made only by frequent repetition. Such success as comes in the case of dull pupils is due to the fact that rote drill affords a mental activity so simple in character and so limited in content that it satisfies the ability of the dull mind. This characteristic tendency for satisfaction with simple activity has been remarked in other studies besides arithmetic.

Although these fundamental processes may perhaps be developed to a considerable degree of proficiency, their transfer into the field of problem solving is made in a very inadequate manner. The remedy suggested is that of providing practical situations in all number combinations. That is, combinations or operations are not to be used without concrete application. Every item in arithmetic should have a definite meaning, every problem that is incorrectly solved should have a penalty attached to it. If practical problems are introduced from the very beginning of number study, the break which now exists between fundamentals and problems will become less marked.

Practical investigations into arithmetical needs in recent years have changed our conceptions of minimal essentials for dull pupils.

The present tendency to keep within narrow limits and to gain mastery at those levels will facilitate more efficient instruction for dull pupils.

Bright Pupils

The desire and the ability to check up on the correctness of their processes are the birthright of superior minds. Bright pupils find that these qualities are of great value in arithmetic. Problem-solving and fundamental operations are both benefited by ideals of accuracy.

In problem-solving, bright pupils show marked superiority in their ability to reason. Reasoning is one of the most important functions of higher intelligence. The ability to generalize and to deal with the abstract are also characteristic of gifted minds, and these qualities are traits of basic importance in mathematics.

In mastering the fundamental operations it would seem rather logical to require rote drill to a very great extent, but rote drill does not carry enough mental activity to appeal to the bright pupil. When it must be used, teachers should find motives for it. For example, in learning the multiplication table of nines, the upward sequence of numbers in the tens and the downward sequence in the units of the products are very effective bonds of association. Bright pupils are usually looking for some such association which will put greater meaning into their learning. When bright pupils seem to refuse to master the fundamental combinations, some too arbitrary plan of work is probably being required which does not meet their mental requirements.

Several reports from teachers stated that, contrary to usual opinion, many bright pupils drilled themselves on fundamental operations at such times as they found necessary. They undertake this drill without instruction from the teacher—in fact, the teacher may be unaware of it. The drill for dull pupils is more easily noted because it must usually be assigned and supervised by the teacher.

Bright pupils are able to 'enrich' their arithmetical work and should be encouraged to do so. For instance, many of them would find a complete mastery of the multiplication combinations up to twenty a valuable aid. They should also render automatic all the simple combinations, until they have gained both speed and accuracy. Their effectiveness in adult life would be much enhanced by such a process. The labor of doing this extra work is not so arduous for them as are the usual requirements for the average pupils.

In our opinion a serious mistake is being made in allowing bright pupils to take a minimal amount of fundamental work. A frequent practice is to allow them to be excused from some of these drills for weeks at a time. But, unless there is a fair amount of repetition of material after its first learning, the retention is not permanent. Talent seldom flourishes without practice, and talent in fundamental operations in arithmetic is no exception.

In the selection of subject matter in arithmetic, bright pupils should be allowed much freedom. They are able to devise problems which contain as much originality as is found in the textbook problems. If a free choice is allowed, arithmetic does not cease to have a great interest, particularly in view of the fact that modern life requires much knowledge of a scientific nature.

The products of higher education are judged mercilessly by an unsympathetic business world, chiefly in terms of ability to figure correctly and to write legibly. These skills probably indicate very little of the candidate's real ability, but since judgment is often based upon such things, their importance cannot be entirely ignored. By a very little extra time and drill apportioned over several years, these obvious ''evidences of practical education'' could be perfected to a surprising degree.

SECTION C. SOCIAL SCIENCE

CHAPTER XIII

AUDITORIUM

The use of the auditorium is a comparatively new development in education. Its origin is based upon the benefits which accrued from school plays, pageants, declamation contests, and kindred activities. It was always very evident that such events contributed certain social values to a child's life that were not derived from the traditional subjects and from traditional methods. The best pupils were usually chosen to participate in such events, and they frequently became the show product of the school.

DULL PUPILS

When these activities are given over to all types of pupils, some interesting problems are brought to light. Dull pupils, as might be expected, do not perform as creditably as do the other groups. But it was quite surprising to find that their lack of social intelligence was one reason for this failure to participate effectively in auditorium work. Our teachers who reported upon dull pupils universally made this complaint against them. The activities of the auditorium make heavy demands upon social contacts, and little of the activity is individualized.

Dull pupils are characterized by teachers as being ''selfish,'' ''suspicious,'' and ''unforgiving.'' They accept criticism as personal. They find it very difficult to subordinate themselves to the larger interests of the group. We prefer not to accept these characteristics as true without further study. We think it likely that if situations are made very simple and choices are made easy, dull pupils will respond in a manner that is more acceptable socially. But although the school situations may be simplified, since they are artificially controlled, the situations in adult society are not susceptible of such simplification. This point is very important. Definite study of the responses of dull pupils in social situations is very necessary. Social contacts and agreeable mannerisms play a large part in determining success or failure in life.

Some of the characteristic anti-social responses which have been brought to light are as follows: Dull pupils do not succeed in committee work. They are unable to agree on candidates, and always turn in a minority report. Their personal preferences for friends determine their choices and blind allegiance is the rule. When a compromise is necessary, they do not trust their own judgment as to how far they should go in making concessions and so refuse to take any chances whatever. If the correction of such tendencies is of fundamental importance, as most would agree, the auditorium has taken on a significant educational function which has been quite overlooked in the past.

In the actual performance of auditorium work, dull pupils attain a very low level of achievement as contrasted with the familiar finished work of bright pupils. They do not coördinate their activities, so that actions and gestures do not coincide with the words they are supposed to accompany. They are apt to transpose words. They are at a loss when they forget important cues.

Dull pupils like simple parts. They always prefer to be poor performers rather than auditors. Plays in which many pupils partipicate best hold their interest and attention. They perform in a manner which calls to mind the hordes of people who flock across certain scenes in modern movie plots. They do not have fertile or accurate imaginations; a dish must be a dish, or it loses its effectiveness. If a book must be substituted for the dish, the dull pupils find it difficult to think of it as a dish. They do not associate current events with activities which might fit into their program. The approach of Lincoln's birthday does not stimulate them to do anything in honor of that statesman. They learn poems and parts by rote, rather than by meaning. Simple plays, repeated again and again, with new pupils assigned to the parts each time, are entirely satisfying. Dramatization and a liberal use of rhythm are effective means of procedure.

It is evident that the teacher must dominate the auditorium work of dull pupils. However, if methods of auditorium work can be so developed as to bring about marked improvement in the social attitudes and responses of dull pupils, a very real educational service will be performed.

Bright Pupils

The values which the work of the auditorium is designed to produce are the natural traits of bright pupils. Superior ability has usually had an opportunity to express itself in social situations. Social intelligence is also characteristic of high abstract intelligence.

Bright pupils are excellent on committee work. They agree upon candidates. They know the weaknesses of certain pupils and assign parts that are capable of being carried out. Differences do not become personal.

In the actual performance in the auditorium, bright pupils take the initiative. They prefer to develop original plays and pantomimes rather than to repeat or reproduce the traditional. They learn by context rather than by rote. Unexpected balks in details do not disturb them, and any improvisions or substitutions that become necessary are enjoyed. Bright pupils do not refuse to be auditors, as long as they are hearing something worth-while.

Successful work in the auditorium can be secured for bright pupils with a minimal of teacher domination. The ability of a teacher to control auditorium programs is really taxed to the limit if she is able to carry out her chief policies and at the same time give a liberal amount of pupil freedom for individuality.

Since bright pupils usually become society's leaders in so many phases of life, it is very essential that a proper social attitude should be cultivated. Disagreements of an impersonal kind, and wise concessions are of fundamental importance. The ability to dismiss fallacies and to weigh evidence impartially is a priceless talent. It is very important that healthy and useful projects be promoted in auditorium work, otherwise the techniques of the auditorium may be utilized to unwise ends. The auditorium as an educational device is, like fire, a useful servant but a bad master.

CHAPTER XIV

NATURE STUDY

DULL PUPILS

The problem of nature study for dull pupils is especially difficult on account of the limited opportunities which they have for first-hand contact with nature. Since intellectual status and social status are quite closely correlated, those who are poorest in intelligence generally live in relatively undesirable environment, with little contact—at least in our cities—with nature. Dull pupils seldom have household pets and very rarely go to parks or to the country. They bring to their work in nature study a meager background which, in comparison with the background of bright pupils, is a discouraging feature. However, the practical results for dull pupils—considering their limited abilities—are probably of much greater value than they are for any other group.

Teaching procedures must be varied to reach the minds of dull pupils. Their natural ability to observe is as limited as is their general intelligence. They do not observe accurately, and apparently obvious phenomena must be actually pointed out for them. The teacher need not fear lest she insult their intelligence by such elementary procedures: on the contrary, she is much more likely to take too much for granted.

Poor powers of observation are not due to defective vision, but to weak impressions upon the nervous system. Dull pupils are inferior in ability to recognize and to distinguish the old and familiar among the new and unfamiliar. If one new element is introduced into a familiar situation they do not recognize the situation. In like manner, one known object or familiar element in a new situation is very liable to go unrecognized among the unfamiliar elements. The introduction of new elements must, therefore, be made gradually and their relations to the entire situation must be explained minutely.

Dull pupils must actually live through experiences, since their imagination is too meager to be of any assistance. They must see, feel, or hear, to make things real. They learn to draw pictures in the early stages of illustrations most effectively by tracing pictures rather than by drawing from copy. The use of bright colors makes this work more fruitful. Many of these basic experiences are acquired by other types of pupils much earlier in life through favorable home training or through self-directed experiences.

The dull show a further limitation in their ability to keep the task in mind. For example, if they have an opportunity to go for a walk and observe flowers and birds, they are quite apt merely to go for a walk. They walk rapidly, get separated from the others, and see nothing on the way. These tendencies suggest that the number of simultaneous activities must be strictly limited, and the main purpose must be frequently re-stated. When planting seeds, they are likely to plant them too deep. When pulling weeds, they pull useful plants as well, while weeds with pretty flowers escape destruction. They enjoy the physical activity of nature study but allow it to interfere with the real outcomes which that activity is supposed to produce. They prefer to copy their neighbor rather than to follow directions made up for their special instruction.

Very definite and practical units of work must be outlined for dull pupils. The teacher should supervise these units closely. Repetition and drill should be used freely. Special contests, such as bird-memory projects, are effective in habit formation and are enjoyed by these pupils. The stimulation of a real love of nature is an important function of nature study. The adult lives of these backward groups should become more pleasant if they are trained to appreciate things which seldom come to their attention under the present unfavorable circumstances of urban life.

Bright Pupils

Appreciation of nature is usually characteristic of bright pupils. Other subjects, such as art, music, and literature, are also studied upon a high level of appreciation. More favorable home environments, more mature mental ages, and a natural interest in activities outside themselves, all combine to make them competent students of nature. There is no reason to assume that, because of their exceptional advantages, bright pupils should be denied an opportunity in nature study. They benefit more than any other group from effective instruction, and should be allowed to make their contributions in every possible field.

Bright pupils live in nature and thoroughly enjoy it. Their fertile imaginations are efficient aids to work. They observe nature accurately and are able to put meaning into what they see. One of the important reasons why they succeed in nature study is that they have a genuine interest in something besides themselves. Dull pupils are inclined to live self-centered lives, but one of the outstanding characteristics of superior intelligence is the ability to appreciate something besides self. The psychological reason for this tendency probably lies in recognition that the environment, rather than the self, provides something new and instructive.

These superior minds are able to work independently. They like long-time projects with delayed returns. They express originality in their projects. They are not afraid of new situations or of strange animals, but study them with interest. Many ancient but common superstitions about natural phenomena are easily resolved by rational explanation.

There should be a minimum of teacher domination. The presentation of the problem is usually sufficient. If bright pupils do not have the necessary information, they prefer to look it up for themselves. They go to great lengths in finding valid reasons for facts in nature study. They are able to generalize details into a meaningful unit.

Contributions from different members of a group are always welcome. Bright pupils excel in work on a joint project. Nature itself is so unlimited in its scope that it offers a boundless field for enrichment of the bright pupil's experience. There is no reason why bright pupils should not identify a great variety of plants, trees, and animals as easily as they recall the multiplication table of the three's. The amazing ignorance of present-day adults, even of superior ones, in these directions leaves much to be desired.

The tendency toward more urban life makes the need of nature study more important than ever before. Superior minds can more easily retain a more rational balance between the artificial and the natural by a thorough training in the facts of nature.

CHAPTER XV

SOCIAL SCIENCE

DULL PUPILS

The term ''social science'' implies that social values are expected in this subject. Dull pupils have many natural limitations in this direction. The order that social science attempts to fill for this group is a large one.

The outlook or point of view of dull pupils is extremely local. Facts of world-wide interest are far removed from them. In adulthood, dull minds are much more interested in what goes on in their immediate neighborhood, among people they know intimately, than in national or international events. True, we try to teach the wider outlook, and the effort should be continued, but the results attained are probably not in keeping with the energy that is expended.

Immediate results and selfish ends are the natural tendencies of dull intelligence. Self and selfish interests dominate the dull mind in very powerful ways. Full knowledge and recognition of this fact should be made, not only in social science, but in all other fields of instruction as well. Whatever widens the interests of dull pupils is truly educational.

The general policy in introducing local geography at the very beginning of social sciences is commendable. This local setting should be developed in short and simple units. It should be concrete; it should contain practical illustrations which may appear to adult minds as entirely too elementary and too obvious. Personal experiences and first-hand observations of the topics for discussion are very essential. As the project gets beyond these points, visual aids, such as slides, films, and pictorial illustrations, should be used freely to insure the establishment of vivid and accurate impressions.

Whenever the material presented extends beyond the sphere of personal observation, there is grave doubt, we believe, as to the type of interpretations which these pupils put into situations. For example, if the American Indian is the topic of study, dull minds are probably impressed with the warlike and ''cowboy'' aspects, whereas the bright pupils are interested in the improvements and changes which our modern civilization has brought about in what was formerly a happy hunting ground. Or, in a study of the life in the Arctic, the dull mind thinks that dog-sledges and heavy fur coats would be great fun, while the bright mind contrasts these elementary means of travel with the modern, comfortable, swift, and efficient methods of transportation. Dull pupils accept these conditions and do not seek out why they are different from our own.

In the interpretations of situations which have been experienced by dull pupils, very little is carried over into the present environment. Dull pupils who have recently come from other countries or from neighboring states can furnish little material of interest to the class.

Each fact or project stands off as a separate unit. The teacher must use her ingenuity to build meaningful entities out of these fragments. Dull pupils prefer to follow others and do not volunteer many worth-while suggestions. They like much physical activity, such as map building from blocks or a liberal use of the sand pile. Dramatization is particularly useful.

Facts of world geography must be presented in very elementary form and expressed in a simple vocabulary. The reasons why commerce follows certain lanes, why manufacturing develops in certain localities, and why certain products of the land are found in one country rather than another, offer legitimate projects for dull pupils, but the presentation must take little for granted. Since their interests do not naturally reach out to these problems, the presentation must be made so simple and effective that the material will be sought out and will be comprehended.

Bright Pupils

Bright pupils naturally work by socialized methods. They get together spontaneously for discussion, as they realize that two heads are better than one—particularly if both are good! They enjoy work in committees or groups. Their favorite method of procedure is to make reports individually on sub-topics, then join in a general discussion of the main topic.

Bright pupils dislike routine repetition and drill in learning the basic facts of social science. They prefer to learn by building up meaningful associations around topics, to which they attach their memory cues. Whenever routine drills seem necessary, they should be interspersed with other types of work. Bright pupils need very little help on the mechanical phases of social science, such as looking up references. They take notes upon the essential points, and can furnish intelligent coöperation and stimuli, so that their projects are discussed and appreciated outside of the schoolroom.

Large projects which involve many activities, and which require a long period of time are practical aids. Coördination of social science with reading in the library, and with presentations in the auditorium is very easily accomplished. They do not need many visual or concrete aids in their work. They are more interested in reasons for things than in how those things look.

Their interests extend out into events beyond their own limited environment. In fact, there is a danger that the concrete and the logical will soon become too elementary and hence deaden the natural interest that bright pupils show in a larger world of affairs. In addition to serving many practical ends, such as knowledge of human adjustments under differing conditions, social science affords an opportunity to read for culture. A considerable number of commendable books have been written in the past few years which offer splendid material for such development. Social science should never be limited to the bare facts of locational geography. Bright pupils, particularly, rebel against such formalization. The natural interests of bright pupils in social needs, rather than individual needs, are important factors in a suitable program of their education.

The extension of interests and of knowledge made possible by modern methods of transportation and communication demands a very liberal education for bright pupils. Foreign trade, opportunities for competition, and for material exchanges are so potential that no leader in a modern industrial enterprise can afford to accept a local point of view. Of course, world geography is so comprehensive that the mastery of detail in every direction and in every activity is out of the question. Hence, the problem of efficient instruction is not only to become acquainted with the experiences of all peoples, but also to develop a practical reference system which may be as useful and as available as the dictionary is for the average schoolroom.

In seeking enrichment of education for bright pupils, no field is more promising of results than is social science, efficiently utilized. The task will be fully met only by affording means which satisfy the psychological traits and interests of bright pupils.

SECTION D. VOCATIONAL EDUCATION

CHAPTER XVI

DOMESTIC SCIENCE

Dull Pupils

When new courses in applied art are developed in a curriculum, there is usually a great demand for these courses by dull pupils. Failure in the traditional courses and faith in something new are the motives behind this demand. The courses in domestic science are no exception. After a long period of learning by the method of trial and error, the weaknesses of dull pupils which are known to exist in other subjects come to light in these courses also.

Dull pupils are much interested in the practical work, but prefer to get their information from experience rather than from the recipe book. Their book learning does not carry over into the practical operations. Although the steps in the process may be written out in concise form, dull pupils prefer to guess or to copy some one else, rather than to be bothered with reading for themselves. When the recipes are studied and outlined under the teacher's direction, these pupils do not give their attention, but wait for others to volunteer.

In the development of the steps of procedure from the recipe book, a problem which involves using half of the amount specified offers difficulties on account of fractions. Hence, the exercises in measurements which are ordinarily developed only in the first few lessons should be repeated at frequent intervals, lest they be quickly forgotten.

The physical activities of domestic science do not disclose any traits in which dull pupils excel or equal the performances of other groups. They are slower and less accurate in their actions. They put on their aprons and caps more slowly and are not orderly in their arrangement of materials. Less than one-half of one such class brought pencils, whereas all the members of the next class of bright pupils did bring theirs. In measuring quantities they are more contented to dip out a few parts of spoonfuls than to measure the amounts exactly. They are liable to put in extra amounts of certain ingredients, and hope to have a larger portion for themselves as a result. In doing so they disturb the proportions and may spoil the entire product. They do not follow the proper sequences, lose valuable time, also waste material. All of these statements suggest that a course simplified to lie within their comprehension is an urgent necessity.

They would rather do the same project over several times than to undertake a new one. If they are permitted to do so, they try to repeat from memory and not from a further study of the recipe book.

It would be an extravagant and wasteful procedure to allow them to start again when things go wrong. Nevertheless, some kind of check upon obvious failures should be used. The stimulus to do correct work is not very strong in dull pupils. When mistakes are made, they shrug their shoulders and are apt to think that failure is due to accidental causes which are beyond their control. They make very little effort to analyze their failures.

Dull pupils may undertake projects too ambitious to be finished in the allotted time. They do not take advantage of short cuts, and do not realize how important time is for many projects. Their ideals of workmanship are on a low plane. They do not have good powers of self-appraisal.

All of these suggestions indicate clearly that if dull pupils are to succeed in domestic science, the units of work must be developed in a very elementary manner. The material must be repeated so as to develop habits of accuracy, and valid means of self-appraisal must be provided.

Bright Pupils

Domestic science affords another place where bright pupils show their superiority over all other groups. Their work is so well done that it becomes an art rather than a science.

They come to class quietly and are ready for work in a very short time. They realize that by saving time on routine details, they conserve time for essentials. If a project is quite long for a period, they are able to devise means of getting through on time without leaving out any of the essential steps.

Bright pupils enjoy the development of the project from the recipe book, and they all take an active part in it. They are able to master the arithmetical computations which are necessary for correct procedures. They find in the 'book' learning or in the theory, a very important educational aim for the physical activities. They see in the execution of these projects a fulfillment of a theoretical plan, whereas dull pupils are most interested in the mechanical part and they look upon the theories and written directions as a more or less necessary evil.

Bright pupils are capable of self-directed work. They are resourceful in finding aids and suggestions from their books. By excellent powers of memory and association, they are able to recall and to apply information that has been furnished elsewhere. They find much in common in projects that ordinarily appear to be very different. Their powers of self-correction and self-appraisal are well developed. If mistakes are made, they are interested in knowing the reasons and can usually determine them without assistance.

Not only are the minimal requirements met by this group, but many supplementary projects are undertaken. They apply their knowledge in a larger social way, such as contributing something for a sick friend or for their church bazaar.

The minimal requirements seldom furnish bright pupils a satisfactory course of study. They seek supplementary information, such as the sources of food products. The processes of food analysis and the theories of food values afford excellent means of enrichment. They get more return for their physical labor if they are able to build up around it an intellectual and interpretative setting.

When these motives are properly applied, the physical execution of tasks become a pleasant application of theories. The physical work of domestic science is not sufficient to hold the interest of bright pupils for long. Teachers will get most effective work when they seek to develop the intellectual phases which the bright pupils find useful and welcome. Under such circumstances, bright pupils dispatch the physical work with great speed and accuracy. They measure carefully, arrange materials economically, check their procedures from the recipe book, and carry on the entire project in an independent and self-directed manner.

The chief problem lies in the proper enrichment of the course and providing wise freedom for them to carry out their own programs.

CHAPTER XVII

MANUAL TRAINING

Dull Pupils

One of the chief goals in manual training is the development of desirable ideals of workmanship. There is a general complaint from teachers of dull pupils that these ideals are not realized on account of faulty techniques and of poor workmanship. A task poorly done may be more detrimental than a task not done at all.

Dull pupils are deficient in motor control. Therefore, in mechanical tasks they do not set a high standard of efficiency. They cannot saw along a straight line, drive a nail without bending it, or use a plane without damaging it. They need much drill upon the manipulation of tools. Such exercises should bring beneficial results, valuable not only in the classroom but also in daily life later on. The destruction of tools and wasting of material by unskilled laborers is a serious problem in industry. It is not only wasteful from an economic point of view, but it is also a source of dissatisfaction and labor turnover. Schools should definitely plan to develop better techniques in dull pupils, for by so doing, they will save a great amount of embarrassment and unhappiness. It should not be assumed that unskilled laborers will acquire these skills through self-teaching, for their mental constitution is such that they lack the initiative to master these techniques independently.

If standards of excellent workmanship are ideals which develop good character, the standards of excellence must be on a very simple level for dull pupils.

The course in manual training is so planned that pupils must ascertain the procedures from a printed outline, and then carry on the actual work from those directions. Dull pupils have many difficulties in putting this plan into effect. They are sometimes unable to read the material comprehendingly, or if it is thoroughly understood, they are not able to visualize it in actual practice. There seems to be a definite break in the line of thought from the printed page to the work bench. Or if the work is actually understood, dull pupils proceed in a somewhat haphazard manner, as a result of poor initiative. When the execution is finally undertaken, the technique is quite faulty. None of these defects is very serious when considered by itself, but the combined effect is an unfavorable outcome. The mention of such defects is not an indictment of dull pupils; they are mentioned that they may be recognized as problems which the schools must study and attempt to solve.

Dull pupils prefer to work on tasks that have an immediate goal and on things that will be useful to themselves. Making their own playthings is a favorite task. Although they eventually do only rather simple tasks in manual training, their ambitions are often much beyond the level. They are apt to start ambitious projects without any thought whether they can complete them. The general outline is hastily sketched, the material laid out, but the structure is never completed. Unless the teacher can tactfully govern these tendencies, there is waste of material as well as discouragement for the pupils.

The units of work must be simple and definite. Basic skills and practices should be repeated many times and over long intervals of time. It is desirable to have certain processes mounted for demonstration in definite steps, which should be referred to frequently. In this manner dull pupils may observe processes in the concrete—a means which is more effective than abstract presentations necessitating imagination. Dull pupils like to repeat simple projects, and since their skill and techniques are at a low level of efficiency, repetition aids them in learning to do a few things well.

Bright Pupils

Bright pupils usually set for themselves a high standard of excellence in manual training. There is a popular idea that compensating influences operate to the disadvantage of bright pupils in all kinds of handwork. Actual experience shows that such compensations do not exist. On the contrary, the teacher of manual training prefers bright pupils to dull pupils. When manual training first came into general use, it was thought that dull pupils would surely come to their own, but bright pupils continue to carry off the honors in this field as well.

Ideals of good workmanship are effective goals for bright pupils. They are effective because really excellent work is achieved. These pupils not only set up high standards of workmanship and are able to meet them, but, after their work is completed, they also know just how good it really is, and if there are any defects, they recognize them and know what is needed to correct them.

Bright pupils wish to work independently upon their projects. They not only complete the prescribed course of study, but also initiate many worthy projects themselves. They do not hesitate to undertake large projects and are able to coöperate with others in joint enterprises. They often make things for others.

In the actual classroom procedures of manual training, bright pupils show many excellent habits of work. They read eagerly and understand thoroughly the instructions in the manual. The mental aspect is always foremost in their minds. But after the theoretical has been mastered, they are capable of handling the tools of execution by applying their book learning in very intelligent ways. They read mental significance into physical tasks. If they are not able to do so, or if that type of interpretation should chance to be discouraged for any reason, bright pupils may lose interest in the projects of manual training. In such cases the poor results commonly attributed to bright pupils may appear, but when such a thing happens, we may surmise that the method of instruction is not well adapted for these pupils.

Bright pupils are able to follow detailed directions and remember the applications in later problems. They see a general relationship between one project and another. Therefore, they do not need to be shown many steps a second time. This ability of generalization seldom produces errors and is a great conserver of time and energy. If they get into difficulty, they usually realize it and do not hesitate to ask for advice and help at the proper time.

Very few bright pupils pursue vocations in which manual skill or physical tasks play a part, and therefore it is a splendid thing for them to get some experience in this direction. They are more liable to have a sympathetic point of view toward those whose labors must follow these lines, if they have been through the same experience.

In the physical techniques of manual training, bright pupils maintain high standards. They are superior in motor-control, in muscular coördination, and also in physical strength. They not only plan fine projects, but their workmanship is very commendable.

SECTION E. HEALTH

CHAPTER XVIII

HEALTH EDUCATION

Health education is an activity which calls for physical powers and also for social adjustment. It has often been remarked that more knowledge may be gained of a child's personality by a few hours on the playground than by weeks in the quiet of the classroom.

Dull Pupils

Play involves the stimulation of many instincts. Play, itself, is an instinct in the young of all animals as well as of man, and play brings up rivalry, self-preservation, and a whole series of traits which are either classed as instincts or as instinctive tendencies. Since dull pupils are not as capable as other pupils of controlling their instincts by the use of reasoning and by other intellectual factors, the more unrestrained are the actions which are outlets for instinct. This is confirmed by the actions of dull pupils in play. They are more excitable, more inclined to get angry, and less able to control their personal feelings. Many selfish tendencies come to light. They see situations from their own point of view. They are inclined to excuse their faults and to blame others by building up fictitious and flimsy alibis. These statements were submitted by all the teachers who reported on dull pupils. It ought to be added that many of these teachers are sympathetically and genuinely interested in the dull child as a special problem. These defects of the dull might be deemed merely unpleasant and disconcerting, and as such, could easily be passed by as an educational problem generally, and neglected in health education specifically. However, in adult society these dull pupils will later have to mingle on equal terms with everyone else, so that it is wise policy to allow their deficiencies of social behavior to come to light in the school and to study and devise methods of treatment for them there. The school has been accused of providing an artificial, hothouse situation which does not prepare for life, but the conditions which obtain in health education are a fair attempt to meet this accusation.

A study should be made of the social responses as disclosed in play. A thorough-going analysis of these factors and measures of remedy should be proposed. If education can reproduce situations that are true to life and give training to overcome the undesirable responses which result from them, a very great service will be rendered to society.

Dull pupils are poor in muscular control and motor coördination. In health education these weaknesses are particularly noticeable. They are also lacking in physical strength and cannot compete upon equal terms with other groups of their own age. They often withdraw from games and lean against the wall. They do this partly because they are tired, partly because they do not actually enjoy games that require much social response. They are slow and inaccurate in their actions; they require a longer time than others in changing their shoes in the general preparation for the health class.

They prefer simple games repeated again and again. Games with complicated rules or with intricate combinations of movements should not be required of them. When the mental effort becomes too severe, the physical actions are cramped and subordinated and consequently lose their intended value. They like work in small squads rather than mass games. The work should be broken up into small units.

They have little regard for the other fellow. Selfish traits come to light. They wish to be better, or to hold the most favorable position. They do not consider consequences. In turning somersaults they are liable to start too soon and crash into the one who is just ahead of them. A large amount of teacher domination is necessary for proper control. There is an urgent need for the development of some simple situations in health education that are so elementary in character that if dull pupils fail in them they can analyze their failures. If they succeed, they will realize the satisfaction that comes from success. From these initial points the course in health education should be developed for dull pupils so that they are carried forward as rapidly as possible, but within the limits which they are able to attain.

Another problem of major importance in health education is the improvement that can be expected and realized in the physical strength and motor control of dull pupils. A survey of the discussion of the various school subjects in this treatise discloses the fact that in all subjects of study, the physical aspect of the work of dull pupils is generally described as inaccurate and inadequate. The department of health education has a real educational function in this direction. Exercises that develop strength and secure better motor control are highly desirable, not only for the educational advancement of dull pupils in school, but also as means of improving their general efficiency in the fields of unskilled or semiskilled labor which they enter in adulthood.

Bright Pupils

In general health, in physique, and in ideals of sportsmanship, bright pupils appear to excel all other groups. The problems of instruction for bright pupils are radically different from those of teaching dull pupils. There is an entirely different foundation on which to build, and the process of building is also different.

Bright pupils excel in sportsmanship. They play hard to win and do not give up easily. Competition is accepted as a part of the sport, and does not develop into personal animosities. They are able to see situations from a disinterested and impartial point of view. They believe in fair play and in giving credit to excellent performance by either side. The contrast between the spirit of athletic contests in approved colleges and universities, and the spirit in the poorer sandlots is very striking.

In physical strength and in muscular control bright pupils set a high standard. The health of bright pupils is usually very good, and they are less susceptible to disease and to injury. They receive better care in their homes and disclose their superior intelligence in observing reasonable safeguards, such as avoiding undue exposure when overheated. They have good poise and adjust to the projects of health class in an easy and natural manner. Repetition of routine drill is not necessary to any extent; if needlessly required, it may produce a very unfavorable attitude.

Originality is characteristic of their work. They develop new dances and new games of considerable merit. They accept the responsibility of determining their own course of action. They go about their health work in a rather free and unconventional attitude which should not be mistaken for disobedience or for deliberate disregard for authority. The teacher should outline the general policy for the work, but leave the bright pupils pretty much to their own resources. Abuses of this freedom will seldom be found and may be easily remedied by making the appropriate appeal to them through their intellects.

Their interests in health education are stimulated to a great extent by the social significance which they find in health activities. Thus, they are very helpful in the preparation of pageants or special demonstrations which represent the school, for which they contribute most of the material for the costumes and furnish clever suggestions about many other details.

Since they are the individuals which eventually enter the professions and lead comparatively sedentary lives, a real interest in health activities is of fundamental importance as a safeguard to health in adulthood. If they grow up with a proper appreciation of health, and interest themselves in some sports which yield suitable relaxation and beneficial activity, they will have received a real service from health education.

SECTION F. FINE ARTS

CHAPTER XIX

ART

Art has been the contribution of the talented at all stages of civilization. It is something which cannot be reduced to a routine procedure, nor can it be accomplished by a set of hard and fast rules. The execution of true art calls for originality. Minds that are dull, or those that are average, find difficulty in maintaining a standard of performance in art that even approximates the bright pupil's work.

Dull Pupils

Dull pupils have poor motor control and hence find the mechanics of operation a discouraging factor. They cannot cut accurately along a marked line, or make drawings with a smooth, even touch. Their work is relatively untidy; their drawings are out of proportion. Excessive quantities of paste are scattered promiscuously over the finished product. These observations are cited, not as a condemnation of the dull pupil, but as facts of basic importance in planning for more efficient instruction.

Dull pupils are inferior in art, not only in the physical execution of work, but in the mental aspect as well. They find most satisfaction from copying, item by item, works completed by more skilled hands. This practice probably has some value in setting correct models, but certainly cannot be accepted as the best final product of dull pupils in art. Copying probably develops muscular control and, therefore, has a value for dull pupils. These pupils come to art class with no plans of work; they wait for the teacher to suggest something. They take up a suggestion readily; in fact, they begin on some detail before they have the entire project sufficiently planned. The practice of copying from a classmate is habitual and, although it leads to unsatisfactory results, the moral of the lesson is not comprehended or appreciated, and the practice is continued.

An important function of art instruction is the development of the use of tools. With other groups of pupils, these skills are mastered by a few lessons early in the course. Dull pupils do not become proficient in this work unless they have repeated drills at frequent intervals throughout the semester's work. It is quite safe to take nothing for granted in their mastery of work; each step should be definitely discussed and checked by the teacher.

On account of faulty powers of observation, dull pupils make drawings that have many incorrect or incongruous details. In drawing the human figure they are liable to make a mixed profile of front and side view which does not present a flattering representation of the person who is serving as the model. Dull pupils are liable to draw things as their imagination dictates, rather than to make accurate observations of how they really are. These traits suggest the need of having the material of art courses upon a very simple level and the steps carefully enough outlined that actual mastery of the work is secured. If dull pupils were capable of working independently and of analyzing their own errors, instruction would be more effective, but these important powers are also inadequately developed.

Courses in art should have an important place in the education of dull pupils. The first step in a proper attitude upon the part of the teacher is to forget, temporarily, the excellent work of bright pupils which has always been the standard. The teacher must take these pupils as they are and build upon those abilities.

Expression in art may open some avenues which the dull mind has not discovered in the traditional courses of the curriculum. Dull pupils will not excel bright pupils or average pupils, but they may come nearer to meeting the standards in non-linguistic work than in the courses that have long been established in the traditional fields.

BRIGHT PUPILS

Work and study in art have always been a natural gift of bright minds. Schools have been inclined to marvel at the talent of bright pupils. But instead of pausing to marvel, a study of how to make their achievements even more remarkable is much to be desired. The writer believes that the human race is capable of making great progress in the matter of new and original contributions in the various arts, and that the proper study and encouragement of gifted minds is the most likely avenue of such development.

Art is truly art for bright pupils. This statement is true because this group of pupils can execute projects in art to a splendid degree of completion. They put into it a natural ability and an originality which cannot be learned from books and possibly not from teachers.

In the mechanical and physical execution of tasks, bright pupils set a very commendable standard. They have fine muscular coördination and motor control, which are invaluable aids. These traits not only make possible a high degree of perfection but also stimulate the initiation of projects, which bright pupils realize they can carry through to successful completion. Success makes for interest and for further effort toward perfection. Although the motor execution is very good, the ideas of bright pupils are much more rapid. Confusion may sometimes result when nimble fingers lag behind the more nimble thoughts and ideas.

They delight in carrying out complicated and extensive projects for the larger social uses of the school. Pageants, shows, and school entertainments, which may be enriched by the decorations from the study of art, are given a splendid finishing touch through the contributions of this group. Most efficient work in art is realized when bright pupils are allowed considerable free choice of their activities. The domination of the teacher is almost reduced to the minimum; suggestions, rather than instructions, are the most effective incentives to work.

Bright pupils retain and develop their interest in art if they are brought into contact with the theoretical phases as well as with the immediate projects and their execution. Theories of color mixture, simple lessons in geometrical principles for accurate drawings, offer a very important motive for the enrichment of the course of study. History of art and architecture, and the study of the modern developments in those fields, are of great interest and meaning to these pupils. The teacher of art overlooks a very important motive for bright pupils if she does not emphasize the significance of the theory which underlies the practical work. Manual work, without any intellectual concomitants, means very little to bright pupils in any school subject.

In the art work, pupils of high ability disclose their favorable social trends. They enjoy group discussion and are all willing and anxious to participate. They derive great pleasure from working coöperatively with a committee in providing material for large school functions.

The work in art offers an exceptional opportunity for bright pupils, in that it provides free play for initiative and originality. The work is important in itself also in that it provides the means for a very enjoyable avocation, which may continue to function throughout life. Bright pupils are more nearly able to take full advantage of what art has to offer than any other group. The development of art and appreciation of art in an age which is dominated by materialism, is a very worthy function of education.

CHAPTER XX

MUSIC

There is a very great difference between music at the level of mere rhythm on the drum, and the finished playing of a full orchestra of professional musicians. We need to remember in our discussion that music is something which may be expressed in a very simple fashion, or which may be so complex that it requires many artists playing together on various instruments to produce the desired effect.

DULL PUPILS

There are definite traits which characterize the musical instruction of dull pupils. They are interested in rhythm, as in marching to music, and in simple melodies. The melody of a song, as such, appeals to them more than as an interpretation of the words. The words naturally require some thought interpretations, and the melody, in simple form, does not need expression in such a manner. Dull pupils are more impressed with a very simple presentation of music than with a complex interpretation. The very crude musical instruments of the savage, with their monotonous and long continued rhythms, satisfy the musical taste of uncivilized races, and in some measures, those tastes still persist in the simpler levels of intelligence.

The physical manifestations of music make the greatest appeal to dull pupils. They are more impressed with the vigorous movements of the temperamental conductor than with the themes he is trying to interpret. The focus of their attention is very apt to be on the tympani player who has to move about in handling his instruments, whereas the quiet pose of the first violinist does not invite attention, although his part may really be the predominating factor.

In singing, they wait for others to get the pitch or to lead. They need careful guidance by someone who can determine the tempo and observe the rests. They prefer to do mass singing, so that their individual deficiencies may be concealed. A few of the more self-confident who wish to perform individually may be totally unaware of any imperfections in their techniques. They forget songs unless they are repeated very often. New material should be very simple. It should be introduced gradually and in small units.

Music must have a strong physical activity to appeal strongly to the dull pupils. Marching, beating time, and playing the drum are typical motor props which render musical impressions more vivid and definite for dull pupils. Unless this appeal is recognized and used to some extent, dull pupils are apt to find that music does not appeal to them. The jingle of jazz does, of course, strike their fancy.

More difficulties from monotones are reported among dull pupils than among the other groups. Poor physical conditions of the vocal organs are also reported as being "very common" among dull pupils.

Inasmuch as music stands for culture and for refinement, the attempt to develop musical education for dull pupils should be encouraged.

Bright Pupils

Music, in its more advanced forms, appeals to bright pupils. They have a very high type of appreciation. They interpret the themes of songs from the meaning of the words. Their interpretations of themes from the descriptive settings are very accurate and full of meaning.

Bright pupils become experts in understanding music notations. They readily grasp key signatures, values of rests, the significance of accent. Each member of the class works with enough independence and self-confidence so that he is not an obstacle to group progress, and his effort coördinates well with the others. He thoroughly enjoys the social aspects of team-work and coöperation.

Drill in music should seldom be reduced to a simple routine basis for bright pupils. They enjoy working on a complicated musical project which extends over a considerable period of time, and which contributes to the spirit of the school.

Another outstanding characteristic of bright pupils is their ability to adapt themselves to music. They are usually able to take up the playing of an instrument and make very rapid strides with learning to play it. If playing a second instrument is undertaken, there is a very economical transfer of habits and of general musical knowledge to this new field of endeavor. As a group bright pupils have good muscular coördination and excellent motor control—qualities which they find of great assistance in learning to play any instrument. They attain a perfection in bowing stringed instruments which is quite beyond any other groups.

The interpretative phases of music appeal most strongly to bright pupils. The words of songs carry significant meanings. The themes of orchestral music are grasped and comprehended. They learn to ignore the merely physical aspects of the orchestra, and observe behind these things the development of themes. In their own performances they are quick to grasp the spirit of a composition and attempt to express that spirit to the best of their ability. In operatic singing they act out in a very natural way the theme which the passage implies.

The theories of music which are the development of the principles of harmony, furnish a keen intellectual content for bright pupils. The demands upon mathematical ability for the complete understanding of the best classical music are very great. The history of music, the lives of great composers, the evolution of music and of musical instruments are all legitimate means of enriching the course of study in music for bright pupils. All such devices which may be introduced in the teaching of bright pupils will furnish intellectual meaning for them and foster their abiding interest in music.

Music is a powerful factor in culture for the development of which society must depend upon the brighter minds. Hence the decided importance of adequate musical education for bright pupils.

PART III

DIFFERENCES IN SCHOOL PROCEDURE

CHAPTER XXI

GENERAL DIFFERENCES IN METHODS OF TEACHING

The teacher is the most important factor to be considered in adjusting the schools to the needs of bright pupils and of dull pupils. The courses of study may be properly modified, and the classification of pupils may be carefully made, but if the teacher is not trained to meet these problems, the program is apt to be inefficient. Teacher-training institutions have a real duty to meet here. The modern teacher receives a thorough training in the techniques of subject matter. She also studies the psychology of the average pupil, but the problems of bright pupils and of dull pupils usually go untouched. The study of these groups is neglected, not only in the field of general and educational psychology, but also in the adaptations of subject matter and of methods in the teacher's field of specialization. For these reasons, inexperienced teachers are quite unprepared to meet such problems. In this chapter, the main problem will be discussed from the teaching point of view.

The common attitude of the inexperienced teacher is that of decided preference for teaching bright pupils. ''Dull pupils are so slow and dumb; bright pupils learn so much and it is so easy to teach them.'' When such reasons are cited it is evident to us that the nature of the problem of either group has not been understood. In both cases the teacher's attitude leaves much to be desired, but the fault lies largely in the inadequate training she has received. The situations must be corrected at their sources.

General Differences in Teaching

The teacher who has a group of bright pupils must proceed along quite different lines from the teacher of dull pupils. In dealing with bright pupils the teacher must specialize upon main issues, and direct the general policies. She must be able to short-cut minor details in the interest of making rapid progress. The teacher of dull pupils must be able to make herself a foreman who is primarily concerned with the administration of details. She must have infinite patience to wait for results. Both types of teaching require resourcefulness, intelligence, and adaptability.

THE TEACHING OF DULL PUPILS

If dull pupils are taught subject matter at the proper mental level, by methods which are suited to their characteristics, the problems of instruction are no more difficult than for any other groups. In fact, these are probably the easiest pupils to teach. The units of work must be very short, simple, concise and definite. Teaching must be conducted in a direct manner. The ability of the teaching is taxed to break the subject matter up into the desirable kind of units.

A great amount of drill and learning by rote is necessary. The teacher must supervise and conduct these drills. The drills should be frequent enough so that learning is effective, and should be repeated often enough so that the material is retained. Drill is fatiguing if carried on for long periods at one sitting. Drills must be short, but should be repeated at frequent intervals. This type of work requires patience on the teacher's part, but contains no elements of great difficulty.

The teacher will find it necessary to explain many things which seem so obvious to her that explanation seems entirely superfluous. It is not safe to take anything for granted. In such simple situations as handwriting, dull pupils are liable to adopt entirely wrong procedures. For example, the figure '7' may look quite well in their writing, but yet have been made by starting from the bottom, instead of from the top. They may also place the upper part of the figure '4' to the right instead of to the left. Not only the product of work, then, but the process as well, should be watched closely.

Dull pupils frequently believe that they have correct results when they are entirely wrong. We observed a class recently in which several dull pupils were asked to raise their hands when they found the place on a certain page. After several hands were held up, the teacher proceeded with the next step, but several in the class whose hands had been raised did not actually have the right place at all. They must be told quite specifically just what to do, and following that, the actual execution of the task must be supervised and verified.

It should be remembered that dull pupils are apt to attach meaning to the physical factors of learning, instead of to the meaning or the interpretation. When a teacher has made a careful explanation of the significance of a special point, she is often surprised and chagrined to have dull pupils propose questions about it which appear to be entirely beside the point. They introduce things which appeal to them in special ways, without reference to the general topic. Recently, in a recitation on the geography of Europe, the discussion was centered about the Alps. One boy of the dull group interrupted the discussion several times to mention the Scandinavian countries. This procedure became more or less irritating to the teacher and to the class, and finally this pupil was asked to explain his point. He had no contribution to make and could not locate the Scandinavian countries on the map. When he was questioned as to the actual reason for his insistence upon this topic, it developed that he had acquired a special fondness for that word, and was trying to use it on all occasions.

These illustrations show well enough, we hope, the types of response which may be expected of dull pupils. The teacher must be analytical, resourceful, and patient. With the use of suitable methods the task of teaching dull pupils should be no more difficult than that of teaching other groups. The teacher's point of view should be such that there is no suggestion to the pupils or to herself that they are inferior to other pupils. Nothing can change or improve their mental status to any extent; the function of the teacher is to make the most that she can out of the raw material at hand.

The Teaching of Bright Pupils

There is a common impression that it is very easy to teach bright pupils. The facts are, that if bright pupils are really taught, the problem is not so easy as it seems to be. If a teacher allows bright pupils to mark time on a program which is intended for average pupils, or does not outline enough to do, so that the pupils take the initiative, teaching probably does appear to be easy. But if she requires them to meet a suitable standard, and if she teaches by methods which are truly adapted to bright pupils, the task demands good teaching ability.

Bright pupils often amaze teachers with the knowledge they possess, or with the skills they have developed. If the teacher attempts to answer their numerous questions, she will find that these demand of her the possession of a wide range of information. It would be an exceptionally versatile teacher who could live up to the expectations of such pupils. The teacher who attempts to answer all questions and fails in the attempt, soon loses the esteem of her class. The safest procedure, and the one with best psychological justification, is to aid bright pupils in finding out information for themselves. Since they are capable of independent work, there are many times when the method of self-teaching is properly to be employed.

The teacher of bright pupils should outline the general plans for the course. Although the work of any lesson should be definite, the plans should cover several days or weeks, instead of the next lesson only. A large number of topics must be prepared, or the class will not be busy all the time. If such gaps occur, the pupils will plan work for themselves and the teacher will discover that she is no longer guiding the policies of the work. There will seldom be any physical evidence of pupils' domination and they will probably continue to show respect to the teacher, but undesirable attitudes will develop.

There should not be too much insistence upon attention to the mastery of details apart from their use or relation to mastery of the whole subject. Bright pupils are less concerned with them than with the subject as a whole. It requires a fine technique in teaching to induce bright pupils to master fundamental skills by rote work and drill. Some teachers try to enforce drill in a dogmatic way with very inadequate results and a definite loss of interest. As a matter of fact, bright pupils usually excel in the drill work because of their own appreciation of its value. They drill themselves when they feel the need, and it is a mistake to set up arbitrary times or plans for it. Bright pupils are looking for situations which provide meanings and they are seldom happy in doing things on the level of rote learning.

The enrichment of the course of study is greatly needed for bright pupils. If the course is not enriched, they merely proceed more rapidly through the basic course for average pupils. In this way they find material which suits their mental level, but which is beyond their social maturity, and which would be more effective at a later time. In order to enrich the course, the teacher must be well informed about sources of information and types of material suitable for such enrichment.

Above all things, it should be remembered that bright pupils are capable of working independently. Teacher domination must be reduced to a minimum, and the teacher who cannot do so is not qualified to teach bright pupils. These pupils are fundamentally interested in what education has to offer them under its most favorable conditions. They accept responsibility for their own behavior. They may go about their work with an enthusiasm and energy which may almost seem to disturb the discipline of the room. This type of activity should not be mistaken for an improper attitude toward discipline. Bright pupils are sometimes unjustly accused of being undisciplined on this account. A word or suggestion in a quiet way is usually enough to impress them that they are disturbing the rest of the class. Arbitrary methods of discipline are seldom effective, and even at best lessen the morale of bright pupils.

These general differences between the problem of teaching bright pupils and that of teaching dull pupils are so marked that they warrant special attention by teachers in training and by teachers in service. The two groups of pupils are so fundamentally different that no teacher who teaches several subjects can hope to do full justice to both groups. It is desirable to have teachers trained to teach one or the other of these groups, in addition to a group of average pupils. She will then specialize in one of these fields besides her general qualifications for teaching the large group of average ability. The teachers of special subjects, such as music, will probably find it necessary to teach all three intelligence groups. But since subject matter is very limited in these cases, a greater specialization in methods of teaching is possible. If it is actually necessary for the teacher of special subjects to teach the entire range of ability groups, she should have the groups sufficiently segregated so that she is not required to teach dull pupils and bright pupils in the same class.

In the last analysis, the successful education of all pupils depends directly on the teacher. Her training, her attitude, and her adaptability are factors of extreme importance.

CHAPTER XXII

DIFFERENCES BECAUSE OF MENTAL LEVEL

Up to the present point we have dealt with differences in intelligence in qualitative terms. Previous studies have been concerned chiefly with quantitative terms. It is the writer's opinion that merely calling attention to quantitative differences as expressed in I.Q.'s, in raw scores, or in letter ratings, has done little to meet the fundamental problems of differentiated instruction. For this reason the major portion of this discussion has been given over to the more important problem of instruction and only minor emphasis has been placed upon quantitative differences.

However, differences in mental ability, as expressed in measurable units, have two very important functions in putting an efficient program of instruction into effect: (1) The differences indicate the mental levels at which instruction must be carried on to function economically for all pupils; (2) They indicate what types of pupils should be grouped together for most efficient instruction.

RANGE OF I.Q.'S

A range of sixty points in I.Q. (from 70 to 130) includes practically all pupils at any age. Below the limit of I.Q. 70, about two per cent of the pupils are to be found. In most progressive school systems this lower group is instructed in special classes for subnormal children. The specialized techniques which have been developed in recent years to teach these backward pupils have been complacently ignored by those who have had to deal with dull pupils. Of course, dull pupils are somewhat more capable than the subnormal, but the psychology of their learning is quite similar to that of the subnormal in many respects.

At the upper extreme are found a few pupils whose I.Q.'s are 130 points, or higher. These gifted children need a special educational program. Few cities have classes for such pupils, primarily because they are doing satisfactory work with the usual course of study, and secondarily because teachers are reluctant to part with their most talented pupils.

Within this range of sixty points in I.Q.'s, from 70 to 130, at least ninety-five percent of all pupils are to be found. Approximately twenty percent of all pupils have I.Q.'s less than ninety, and an equal percentage have I.Q.'s above 110. The sixty percent whose I.Q.'s fall between 90 and 110 are designated as normal, the upper group as bright and the lower group as dull.[12]

RANGE OF I.Q.'S IN ABILITY GROUPS

In school systems where attempts have been made to form ability groups, the divisions usually have been made into three groups. Some systems divide the range of I.Q.'s, so that twenty-five per cent are found in both extreme sections and fifty percent in the average group. In Detroit they are arranged so that the range of sixty points in I.Q. is broken into three numerically equal divisions by sectioning at I.Q.'s 90 and 110. As a result, twenty percent are in the dull, or Z, group; sixty percent in the average, or Y, group, and twenty percent in the bright, or X, group. This plan was adopted so that there would be an equal range of I.Q.'s in each of the three groups.

In the Detroit plan, group intelligence tests are the basis of these ability groupings. Letter ratings are used, rather than group mental ages or group I.Q.'s. The general relation of these ratings to I.Q's and mental ages is shown for the six-year-olds in Table II.

TABLE II

PERCENTS OF LETTER RATINGS, AND RANGES OF I.Q.'s AND MENTAL AGES

(CHRONOLOGICAL AGE, SIX YEARS, SIX MONTHS)

Percent	Group Letter-Rating	I.Q.	Mental Age	Group
8	A	118 to 130 or higher	7– 8 to 8–5 or higher	X
12	B	111 to 117	7– 3 to 7–7	
18	C+	105 to 110	6–10 to 7–2	Y
24	C	96 to 104	6– 3 to 6–9	
18	C—	90 to 95	5–10 to 6–2	
12	D	83 to 89	5– 5 to 5–9	Z
8	E	70 or lower to 82	4– 7 or less to 5–4	

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[12] Terman, L. M. *The Intelligence of School Children.* Houghton, Miffiin Co., 1919. 317 pp.

We believe that I.Q.'s and mental ages imply an exactness of measurement which is not to be expected from group tests, and that these terms should be reserved for the more thorough system of individual Binet examination. Letter ratings are adequate for our purposes.

RANGE OF MENTAL AGES

The mental ages of Table II indicate the level at which instruction may be carried on, but do not determine brightness unless used in conjunction with chronological age. The range of mental ages for pupils entering school at the average age of six years, six months, is from four years, seven months for I.Q. 70, to eight years, five months, for I.Q. 130. This is a range of three years, eleven months. If we are to accept the dictum that a pupil's achievement more nearly corresponds to his mental age than to his chronological age, there is a very obvious need for a differentiated course of study as early as the first grade or even the kindergarten. The instructional needs in the first grade range from pre-kindergarten course to work of the traditional third-grade level. It is a commonly accepted assertion that a mental age of at least six years is necessary for successful mastery of the initial stages of reading. An inspection of the range and distribution of mental ages in the first grade shows that approximately thirty-five percent of first-grade pupils measure less than six years mentally. Before attempts were made to use ability groupings and to establish more than one standard for the entire first grade in Detroit, failures among these pupils ran from thirty to thirty-five percent each semester. This amount of failure in Detroit, as well as in other cities, corresponds very closely to the number of pupils in the first grade whose mental age is below six years.

MENTAL AGES IN ABILITY GROUPINGS

The extreme range of mental ages in the first grade has been noted above, but the numbers of pupils who are found at either extreme of the distribution are relatively few. As the average, or center of distribution for the first grade is approached, the number, or frequency, of cases increases. In Detroit, the division at twenty percent places pupils in the dull, or Z, group with I.Q.'s from 70 to 90. The average I.Q. of this group is about 83, rather than 80, on account of the fact that more pupils have I.Q.'s between 80 and 90, than between 70 and 80. For pupils who are six years, six months, chronologically, an I.Q. of 83 yields a mental age of five years, five months. Therefore, the expected average mental age of the dull, or Z, group in the beginning first grade is five years, five months. In like manner, the average I.Q. for the bright, or X, group is 117, and a mental age of seven years, seven months, results from this I.Q. For the middle, or Y, group the average I.Q. is 100 and the average mental age is six years, six months.

The average mental ages for X, Y, and Z groups from the first grade to the ninth grade are shown in Table III.

TABLE III

AVERAGE MENTAL AGES IN X, Y, AND Z GROUPS, BY GRADES

GRADE	AGE	GROUP		
		Z (I.Q. 83)	Y (I.Q. 100)	X (I.Q. 117)
B1	6– 6	5– 5	6– 6	7– 7
A1	7– 0	5–10	7– 0	8– 1
B2	7– 6	6– 3	7– 6	8– 9
A2	8– 0	6– 8	8– 0	9– 4
B3	8– 6	7– 1	8– 6	9–11
A3	9– 0	7– 6	9– 0	10– 6
B4	9– 6	7–11	9– 6	11– 2
A4	10– 0	8– 4	10– 0	11– 9
B5	10– 6	8– 9	10– 6	12– 4
A5	11– 0	9– 2	11– 0	12–11
B6	11– 6	9– 7	11– 6	13– 6
A6	12– 0	10– 0	12– 0	14– 1
B7	12– 6	10– 5	12– 6	14– 8
A7	13– 0	10–10	13– 0	15– 3
B8	13– 6	11– 3	13– 6	15–10
A8	14– 0	11– 8	14– 0	16– 5
B9	14– 6	12– 1	14– 6	17– 0
A9	15– 0	12– 6	15– 0	17– 7

The data shown in Table III deserve most careful consideration in planning differentiated courses of study. A clearer perspective of the entire situation may be gained from this point of view.

It has already been remarked that the range of mental age in the first grade is approximately four years. In the B-1st grade, the average mental age of the Z group is five years, five months; in the X group it is seven years, seven months. The difference is two years, two months. An inspection of mental ages in Table III shows that the differences in mental ages between X and Z groups increase as the more advanced grades in school are reached. In other words, pupils differ greatly in mental development at school entrance, and these differences become greater as pupils grow older. These differences in average mental age of the X and the Z groups increase from a span of over two years in the first grade to a span of three years by the end of the third grade, of four years in the sixth grade, and of five years in the ninth grade. It would seem reasonable to expect that it would theoretically amount to six years in the twelfth grade, but other factors have operated by this time to produce elimination of the lower group.

The need for differentiated educational procedures between X and Z groups is obvious at all age-levels, and the need seems greater in the higher grades. Although the mental-age ranges between ability groups in the early primary grades are actually less than in upper grades, they are proportionally equivalent in all grades on account of the differences in the chronological ages of pupils.

MENTAL GROWTH VERSUS MENTAL DIFFERENCES

There is a prevalent impression that the dull pupils who constitute the Z group are hopelessly backward in mental level and in mental growth. Two factors are involved in this belief: (1) the actual mental differences between dull and average pupils; (2) the differences in rate of mental growth of the two groups. Confusion may be avoided by recalling that differences in rate of mental growth have been operating ever since earliest infancy, and therefore children are not all equal in mental ability when they begin attending school. These differing rates of mental growth have operated to produce an average difference in mental ages between typical Z groups and Y groups of one year, one month, by the time a chronological age of six years, six months, is reached. (See Table III).

Without giving much thought to the fact that continuously operating differences in rate of mental growth must, even if small, eventually produce decided differences in mental level, these differences in level are incorrectly assumed to indicate an extremely slow rate of mental growth. Thus, in the first grade, pupils of the Z group have a mental age of less than six years and hence do not readily learn to read. Pupils of the Y group have a mental age sufficiently high to master the initial stages of reading. Since intelligence is judged by teachers largely in terms of ability to master school work, the difference between ability and non-ability in reading constitutes for them a very significant gap in mental development. Dull pupils do very little with reading in the first semester and get only a fair start in the second semester, whereas average or bright pupils make rapid strides from the first few weeks. These conditions seem to indicate that the Z group will always be very backward, but fortunately, that conclusion is not fully warranted. A clear understanding of the significance of rate of mental growth, as shown in Table III, should eliminate much of the confusion between these two distinct phenomena of mental development.

Mental Growth of Dull Pupils

If a study is made of the mental growth of pupils in the Z group, it is evident that these pupils actually make a very fair rate of mental growth. In each six months of time they gain five months in mental age. The ratio of mental growth to the increase in chronological age is .83, which corresponds to the average I.Q. 83, of the Z group. It should be emphasized that 83 percent normal progress is relatively a very favorable rate of growth. This statement offers a definite contrast to the opinion that the Z group make little or no mental progress.

If the course of study for Z groups is so arranged that pupils are not expected to begin the study of reading until they are mentally mature enough to do so without undue difficulty, these erroneous impressions as to lack of mental growth will be corrected. The same condition exists with respect to the mastery of all other subjects at a time when the mental growth is advanced sufficiently to warrant an expectation of success.

These conditions suggest that separate courses of study and standards of promotion, suited to their mental ability, should be developed for dull pupils. Instructional adjustments should be made without reference to the achievement of average pupils, but should parallel the expected mental level of dull pupils at the different ages. The content of such courses is a very important matter, which has been treated elsewhere in this discussion.

Mental Growth of Other Pupils

The mental growth of the Y group tends to equal and parallel the increase in chronological age. Teachers have been accustomed to meet this situation for so many years that very little attention has been paid to the development of the average child. The average group offers some problems but at the present moment, the other groups are in greater need of adjustment.

The mental growth of bright pupils has already placed their mental age above par by the time of school entrance. They not only start in school with a mental age on the average thirteen months above that of average pupils, but gain seven months in each subsequent six months of time. Their ratio of mental growth is 1.17, or seven-sixths normal progress. The type of educational adjustment best suited to this situation continues to be a very important educational problem.

Applications to Education

Educators have been aware of these mental differences in a general way for many years, and in a much more specific manner in the immediate past because of the widespread use of mental tests. Results of mental tests have been of interest to educational statisticians on account of the numerical scores which have been provided. Almost every conceivable statistical device has been called into play in discussing, and probably at times in disguising, the real significance of the results which have been obtained.

School administrators have been satisfied to know that an extensive testing program has been carried on—as evidence of a progressive school organization. Teachers have given tests, or sometimes accepted results, in much the same spirit, and are gratified to learn that pupils who have failed are also lowest in the mental test results. The major burden of responsibility has been accepted by psychologists in attempting to outline a constructive policy for use of results. They have seldom been assigned sufficient authority, or demanded sufficient administrative power, to see that applied measures were put into effect. The net result of this very popular educational movement has been a gradual awakening to the realization that test results have little value in themselves, but do have a very important place in the educational adjustments of large numbers of pupils.

The chief functions of mental test scores in education are: (1) to identify pupils that are fundamentally bright or dull, so that the method of learning characteristic to their minds may be brought into play; (2) to determine the mental level of difficulty at which instruction may profitably be carried on. The first function has been discussed in the earlier chapters; the second has been explained in the present chapter.

In attempting to relate mental level to instructional procedure there is a danger that one course will be offered for all pupils, in which will be enrolled young bright pupils, average pupils, and old dull pupils. If this partial policy is followed, we shall be no further advanced in technique than in the days when only one course was offered. This treatise has endeavored to show the need for a better type of adjustment.

CHAPTER XXIII

MISCELLANEOUS DIFFERENCES

The applications of the quantitative and the qualitative differences in intelligence between bright and dull pupils to the problems of school procedure offer many timely topics for study and research. Within the limits of this book, only the mental and educational differences have been discussed. Unless the fundamental importance of these differences is clearly recognized, there is little need of making adjustments for them in school organization, or in courses of study.

The basic differences will continue to exist, whether or not the schools revise their procedures so as to take full account of them. The schools will function much more effectively when the conditions under which the pupils are being educated become modified to meet the real educational needs. A few of the more urgent needs for better adjustments will be outlined, briefly, in the closing paragraphs.

Organization of Ability Groups

The proper organization of ability groups is recognized as a most important problem of school administration. Very little careful research has been conducted to determine the ways in which maximal educational efficiency may be obtained. This problem is worthy of detailed study and report, and will be the chief topic of a later book.

The main aspect of this problem, from the standpoint of school administration, is the arrangement of ability-groupings so that teaching shall be at maximal efficiency. Many attempts have been made in Detroit and elsewhere to determine the best type of organization. The presence of all three groups—bright, average, and dull—in the same room is evidently not a desirable plan. The assignment of dull pupils exclusively to one teacher does not promote her morale or teaching efficiency, unless she has very unusual ability. The writer has proposed a plan which solves many of these problems. The essential feature is that every teacher shall have at least one-half of her pupils of the average group. By this method she will not lose contact with the normal child or with traditional standards and procedures. In a platoon school the home-room teacher may have assigned to her one entire section of average pupils. In a traditional school she may have one-half of her pupils of average intelligence. For the other half, dull pupils may be assigned or bright pupils may be assigned, but both should not be taught by the same teacher. In the platoon organization her second section would be composed entirely of bright pupils or of dull pupils. In this way a teacher would have only two types of pupils to instruct. She would be either a teacher of the average and the bright or of the average and the dull. She would be able to specialize on the psychology of dull pupils or of bright pupils, and by so doing would become more efficient than by attempting to master sufficient techniques to apply to the entire range of intelligence.

The writer has arranged two or three schools on such a basis for the past semester, and the results have been very effective in the opinion of teachers and principals. More Detroit schools are about ready to take up this type of organization. The detailed steps of procedure for such an organization will be outlined in a subsequent volume on intelligence-groupings. The principles upon which the writer's plan is based are quite simple, as noted above. Such a plan may be operated in a school with not more than eight or ten teachers, and is very easily organized in schools which are larger, but the principal or superintendent should study the plan very carefully in his own school or school system before he puts it into effect.

STANDARDS OF PROMOTION

If instruction is to be differentiated for ability-groups, proper adjustment must be made by suitable standards of promotion. Dull pupils obviously cannot meet the traditional standards for average pupils, and bright pupils easily become indolent when they are used. In Detroit this problem has been studied for several years by a committee[13] composed of three district principals, one of whom is chairman, the supervisor of instruction, the assistant supervisor of research, the supervisor of reading, and the writer, as clinical psychologist. Material has been prepared by the supervisors of elementary-school subjects and presented to the committee.

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[13] Baker, Harry J. Report in *School and Society,* May 9, 1925.

At the present time, standards are available for X groups, for Y groups, and for Z groups in arithmetic, handwriting, reading, the social sciences, and spelling, for Grades I through VI beginning in whatever grade the particular subject is first studied by the pupil. Just recently these standards, which were formerly mimeographed separately by school subjects, have been bound in a multigraphed form into a book of 162 pages. A very limited supply has been prepared so that each Detroit school has two or three copies. It is expected that further study will be made of these standards, and that a revised edition will be printed within a few months.[14]

In addition to the practical work which has been accomplished, the functioning of such a committee in a coöperative enterprise has been very interesting and very gratifying. On account of the diversity of its personnel, its program has been sympathetically received by all departments.

Courses of Study

The standards of promotion have shown in an unmistakable manner the need for courses of study for bright pupils and for dull pupils. Work on these courses is under way by several Detroit supervisors of subject matter. The chief aim of the present volume is to provide a general guide to these supervisors in planning such courses, but the characteristic differences between bright and dull pupils are so universal that our suggestions should be of value in any school system.

The procedure for building differentiated courses of study is a technique which has had little consideration or discussion. The writer believes that those who wish to build such courses effectively must first become intimately acquainted with the psychology of the dull and of the bright pupil, as well as that of the average pupil. Many well-known authorities on subject matter have produced material that has served splendidly for average pupils but that has been quite ineffective for the other types of pupils. All such material should be carefully checked and its results verified in use before a general, sweeping recommendation can be safely made.

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[14] The supply of these standards is exhausted at present.

In the actual process of curriculum-building, teachers in service will offer the greatest contributions. Many excellent teachers who have been teaching bright pupils or dull pupils for several years have built up a wealth of material entirely by their own originality and resourcefulness. The pooling of results from many such teachers will provide, in any school system, an invaluable body of material, which may be consolidated and incorporated into one comprehensive program. The old adage of advantage in numbers was never more true than in this case. Large school systems will doubtless provide such courses which will fit their local needs. Smaller systems will need a more general course for bright pupils and for dull pupils, but such a course may be devised from the combined experience of many large systems.

When courses of study and standards of promotion are generally available, the teacher will be able to meet her problems in a much more effective way than now.

Types of Teaching Procedures

In the past few years many new teaching methods and types of teaching procedures have been devised. Their validity, although subject to much controversy, has been too often declared to be conclusively established, but all of these devices deserve to be reviewed carefully with respect to the several intelligence levels of pupils and to their characteristic methods of learning. The ''purposing'' type of lesson, the ''project method,'' the ''disciplinary method'' of teaching, the ''socialized recitation,'' and the ''individualization of instruction,'' have all received much notice in recent years. Advocates of one plan or another have known certain classes of pupils that have succeeded under such special conditions; other educators have noted the same plans failing miserably in other conditions. In such cases, the determining factor may well have been the type of learning which the particular plan called into play. All of these well-known subjects of controversy must undergo further examination for verification with different ability-groups.

Administrative Problems

In the specialized field of school administration the same types of difficulty have been encountered with respect to bright pupils and to dull pupils. Most of the plans have to do with the progress of pupils. The Dalton plan, the Pueblo plan, and the individualization of instruction, are typical samples. With others, we have entertained doubts as to the universal efficiency of such procedures. For example, individualized instruction does not seem to function in a satisfactory manner with dull pupils. They lack the mental initiative to proceed independently with tasks, no matter how very simple the tasks may be. Bright pupils are able to profit by individualized instruction, but they are so highly endowed with social intelligence that they seem to prefer the socialized type of recitation. These matters need further study on a more comprehensive scale than was formerly applied. At the risk of being dogmatic, the writer ventures an opinion that the claims for individualized instruction have been much more overstated than has the merit of ability-grouping.

Confusing Factors

Ratings by intelligence tests are often made upon age, without respect to grade. That is, ten-year-old pupils are considered as a unit, regardless of the grade in which they are being taught. Teachers set up a grade standard for achievement, and also for intelligence. The results are often in conflict, because the bright young pupils for a grade are compared with dull pupils much older who are more mature physically and who are probably repeating the grade. Dull pupils often seem to excel, especially at the beginning of the term. When the teacher is asked to compare the intelligence or the achievement of such average pupils with those of the same age who are two or three grades more advanced, or to compare the bright pupils with their own age group who are two or three grades behind them, the problem appears in a very different light.

It is often pointed out that teachers of exceptional ability are able to secure very favorable results with dull pupils; in fact, they are able to surpass the results that a poor teacher secures with average pupils. This outcome does not invalidate differences in intelligence; with equal teaching ability in both groups, a different result will be secured.

Finally, it is frequently mentioned that in individual cases bright pupils do poor school work, and dull pupils do excellent work. They do—when a teacher is satisfied to let the bright pupil squander his time. The dull pupil who excels should be encouraged to do so, by all means, and the teacher should then report what factors, such as exceptional industry, regular attendance, and desirable attitudes, seem to be responsible for his success. When these factors have been determined, they should be immediately applied to the other dull pupils. Pointing out the fact that such cases exist does not prove anything except that teachers need to determine their true responsibilities in these cases.

Conclusion

The purpose of this study has been to interpret intelligence in terms of responses to school work, instead of in terms of test scores or I.Q.'s. The evidence of five hundred teachers has been called upon to make this interpretation. The great unanimity of their reports, whether upon the same, or upon different school subjects, lends great credence to this evidence. The observations of mental examiners as to the psychological characteristics of bright pupils and of dull pupils parallel these educational observations in a very remarkable way. Many things in this volume have been stated dogmatically. They will be subjected to experimental verification, but we are convinced that they are substantially correct and that they are more nearly correct than the ''one-course—for all,'' or the ''one-method—for all'' practices that have been followed in the past. If teachers and administrators will proceed with caution and verify their own applications, the message we have sought to convey will, we trust, not fail to be of service to the cause of education.

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